MAGAZINE

Airborne

NUMBER 95
September - October 1989
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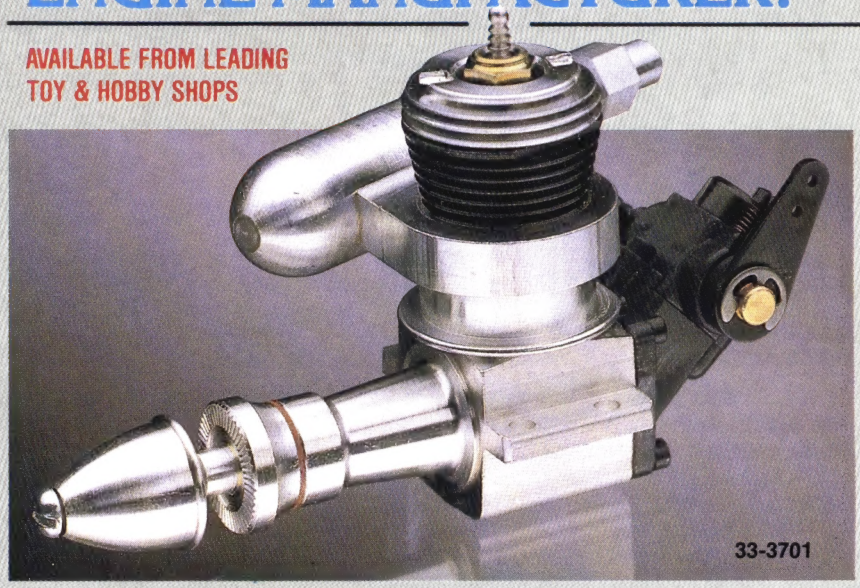
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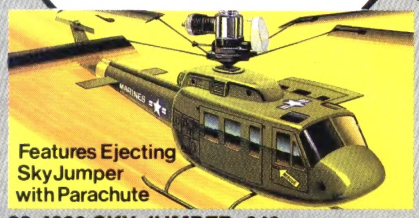
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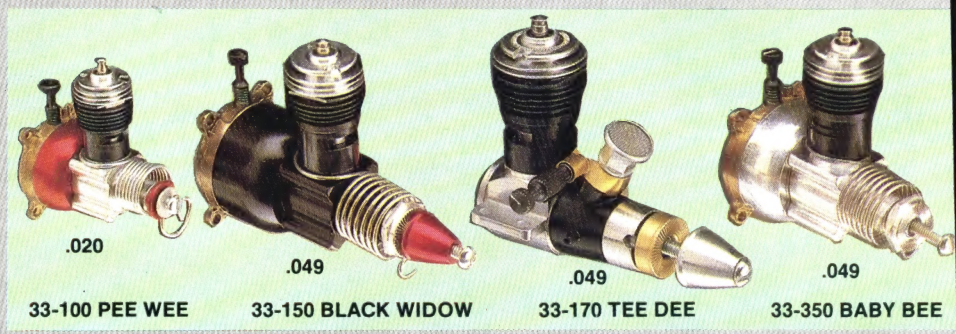
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Anthony Scarf has a rugby top that is colour co-ordinated with the wing of Tony Farnan's EZ Chipmunk. The co-incidence was discovered at the OS-Pilot 4-Stroke Fly-In. Art Scholl would have been amused too!



The lass guarding this large framework is Lorena Richter. The story about the aircraft is in FOCUS on RC.



First elimination heat of Zapspar Challenge, reported in Issue No. 93. The trimaran lacked control, and the striped hull is not an EC12 but a model of Australia 2. Photo from Phil Stevenson. Yachting columnist, Norm Skeen, hands over the helm to Iain Kirley in this issue.

Barry Heard, President of Constellation MFC, with his Sig Skybolt, a real mover with OS 60 FSR and tuned pipe. What about that decoration and finish? Don Howie pic.



Scale maestro, Max Newnham. His P51D was third in stand-off scale at the Amberley Nats. More about control line scale in our regular column.



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The Editor, RMB 1798, Benalla, Vic., 3673.

Payment must be negotiated with the General Manager.

DEADLINES:

No. 96	**8 September**
No. 97	**3 November**

CONTENTS

From the Cockpit 7
Letters to the Editor 8
Focus on RC; by Mel Gillott 13
with items from David Owen, Richard Traill, Ron de Chastel, Ken Draper, Peter Hardy-Atkins, Terry Plunkett, Ivor F, Martin Simons, Stuart Sherlock and Harley Boulton.
Regal Eagle Kit Review; by Tommy Blank 20
The AIRBORNE Engin-ear; by Brian Winch 48
OS 70 Surpass Engine Review; 52
Plans List; 56
Fantails; by Russell Weir 58
Electric Flight; by Phil Stevenson 61
For Old Timer Sake; by Colin Borthwick 66
Pylon Roundup; by John Hughan 70
Flight Analysis; by Martin Simons 74
Rotor Roundabout; by Max Tandy 80
Nats Bulletin; 84
MAAA News; 86
Nats Entry Form; 87
Book Reviews; 90
On Silent Wings; by Bruce Abell 92
New Zealand Notes; 98
Magnum 40 Engine Review; 100
Free Flight Topics; by Merv Buckmaster 102
Control Lines; by Ivars and Maris Dislers 104
Wind & Water; by Norm Skeen 107
Classifieds; 21, 109

COVER STORY The Fairey Fantome was produced in 1935 and was the fastest, most heavily armed biplane fighter. It was powered by a 900 HP V12, Hispano-Suiza engine, and a top speed of 270 MPH (435 Kph) was recorded. Only four of these aircraft were ever produced. The first crashed, the next two were purchased by Soviet Russia and the last one was evaluated by the RAF but no records are available, it's ultimate fate is unknown. This model by Roy Dray (Qld) took 8 months to construct. The model was flown, and then another 5 months of work was needed to roll on the aluminium engine cowl. Powered by a Super Tigre 6000 (60cc twin) and built from 3 views and measurements of the actual aircraft. The other lovely Model in the photo is Leanne Cox, age 18, of Palm Beach Qld. Photography by Kevin Poulter Studios Melb.

ADVERTISERS INDEX

ABC Models....16
Aerial Advantage....64, 65, 73
Aerofan....39, 100
Astropower....62
Australian Hobby Centres....6
Aerotoys....77
Aeromodela....77
Awngold....101
B&D Model Trading....106
Balus Products....54
Bardon & Munday....67
Basham Models....72
Bolly Props....39
Bryzen Hobbies....12
Brian Burke Enterprises....103, 105
Bundaberg....73
Castle Hill....40
CD Engineering....63
Century Jet Models....100
Control Tower....73
Custom Marine....109
Dawn Trading....14, 38
Dax Model Engines....60
Eastern Hobbies....42
East Coast....24
Emco....69
Fliteline....99
Futaba....18
Hawthorn Hobbies....44
Hobby City....78, 79
Hobby Connection (The)....10
Hobby Headquarters....36, 37
Hobby Supplies....89
Imprint....39
J M Innovations....39
Kelletts....46, 47
Kempsey....34
Kookaburra Tech Publications....99
Kraft....10, 26, 35
Kyosho....IBC
Magnum Model Products....44
Micro Electronics....8
Mr Toys....30
Model Engines....3, 55, OBC
Model Sports & Hobbies....59
Mr Plywood....97
Mini Machine Tools Corp....42
Model Design....91
Orchards....42
O'Reilly, Leo....34
Owen Engines....69
Picco Model Engines Aust....101
Pricerite Engineering....97
Radio Control Supplies....32
RC Helicopters....66, 83
Rice, Graham....101
Racing Model Boat Club....108
R&J Models....101
RJ Model Enterprises....44
Scale Craft....72
Scale Model Research....54
SG Photo Air....90
Skyraider....28
Southern Models....IFC, 59
Southern Sailplanes....97
Schmidt, H. J....96
Tates Perf Hobbies....24
Valley Radio Flyers Inc....73
VFFS....102
Woolfe, Alan....72
Waikerie Gliding Club....95
Western Flying School....91
Williamstown Hobbies....22, 40
Wings'N'Things....53
WSSM....90

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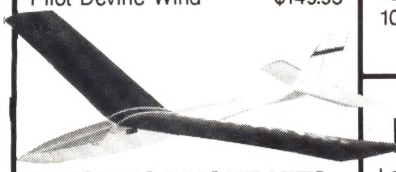
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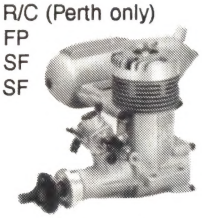
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From the Cockpit

CORRECTION

It has been pointed out that the term powered glider is perhaps a contradiction of terms, although all gliders are powered; by gravitational force, rather than by a motor. Many years ago, soarable aircraft with auxiliary motors were called motor gliders - motor segler - and the term electric glider seems to have been accepted by the modelling fraternity. With the proposal of a motor powered glider class in the latest RCAS newsletter, the designation for these models needs to be settled. A new name, auxiliary powered sailplanes, seems to be too cumbersome, so perhaps motor segler (electric or i.c.) will be satisfactory to pilots of all countries.

CONTACT

..... Pakenham DARCS through Secretary Graham McDonald, 6 Parwan Crt., Frankston, Vic., 3200; phone (03) 789 3609. Yep! Same guy as last year! He's an ace!

..... Port MacQuarie Aeromodellers' Club, Secretary Alan Beake, P.O. Box 24, Bonny Hills, NSW, 2445. Phone Alan on (065) 85 5060 if you are contemplating a visit.

.....Lilydale and District MFA Inc. Secretary, L. Rodman, 10 Downshire Close, Wantirna Sth., Vic., 3152. Check on activities at the club if your are touring the Dandenongs.

..... Cohuna MFC; new Secretary, Chris Penglase, Box 191, Cohuna, Vic., 3568. His after hours phone number is (054) 56 7572

..... Cessnock District Aeromodellers Club through secretary, Neil Moore, 14 Emerald Street, East Maitland, NSW, 2323. Ask about the possibility of a Veterans' Gathering next year - if you are interested.

APPARENTLY

..... one of our readers thought that a photograph in a recent issue showed a modeller doing an RPM check, with a spectator standing in line with the propeller disc. The reader had seen what damage a prop blade, shed from an engine while it was running, can do to the face; and he insists that engine tuning should be done from behind. We must all agree with this, so why did Airborne publish a photograph of a dangerous practice?

There is a deception caused by the angle from which the photo was taken. It appears to show a dangerous practice but, in fact, the people involved are standing well clear of the danger zone. Be sure that you do likewise.

DUCTED FAN FUN FLY
Venue: Leeton, NSW
Date: 14 & 15 October 1989
Enquiries to Jon Hull, (069) 53 3105 during business hours.

CATCH UP TO FRANK

Between 1934 and 1965 Frank Zaic produced several books of aeromodelling theories, and with lots of plans. These were followed later by revival of more material from the early years, bringing the total to 15 books, containing 2508 pages, showing 1394 plans! These books are still available, and there is a local agent: Trevor Martin, at 65 Shoreham Street, Avondale, Auckland, New Zealand. Contact Trevor for prices and delivery details.

SCALE SOARING CONTEST AGAIN

Date: April 21 and 22, 1990
Processing Saturday morning.
Venue: Waikerie Gliding Club aerodrome.
Accommodation:
WGC clubhouse; Waikerie motels.

To be added to the mailing list for further bulletins, contact Martin Simons, 13 Loch Street, Stepney, SA, 5069.

DON'T MOVE!

The Orange MAC was founded in 1929, and to celebrate its 60th anniversary it will conduct a Static Scale Contest at Orange on 4th & 5th November this year. There will be four classes of competition:
Military pre 1940; Military post 1940;
Civil pre 1940; and Civil post 1940.

Each class will have prizes of $100, $75 and $50 plus trophies. There will also be a Judges' Best of Show and a Public's Best of Show Award, both with cash prizes. There will be no risks with the weather or with flying at this contest! Further details may be obtained from Orange MAC Secretary, Les Hughes, 8 Anzac Place, Orange, NSW, 2800; phone (063) 62 4776.

CHUCKIE KITS

Ivars Dislers sent me an information sheet about Brian Burke's HLG kits. There's the traditionally styled Zapper at 35 cm span for $8 and 60 cm span for $16. A more modern Drifter at the same prices plus a 44 cm span version for $11. The Skimmer that can be either a monoplane, $11, or a biplane (!) for $12. And a canard! That's $10. Plus a V-tailed model called Cruiser for $12. Parts are cut and shaped, and the fuselages are laminated balsa and ply on the larger ones. Assembly with cyano takes only minutes. Add $1.50 each for postage. From:
Brian Burke Enterprises, 3 Alumna Street, Sunnybank Hills, Qld., 4109.
Good on you Brian!

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..... to serve yourself, obtain a little bit of aeronautical history, help somebody less fortunate than you, and at the same time get that Bill Hayden *Warm Inner Glow.*

Doonside Aeromodelling Club is making available its surplus magazines. Most are from the era 1960 to 1980. For $25, in your order of 25 magazines, you will get at least 15 of your first three preferred titles, or your money will be refunded. You will also get at least one earlier than 1960, but not necessarily one later than 1980. With your order enclose a list showing your priority, from 1 through to 10, from the following titles:

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Flying Models	R.C.M. & E.
Meccano Magazine	Radio Modeller

Please make your cheque for $25 payable to: The Stowe Foundation (Model Aeroplane Association Prize), and send it, together with an SASE to: PO Box 11, Doonside, NSW, 2767.

WE FORGOT

..... to mention that Magnificent Magnum four-stroke engines are imported and distributed by Owen Engines of PO Box 1080, Sale, Vic., 3850. Mel Gillott reviewed the Hi-Max 91 in No. 94, but its source was not mentioned.

† STAN PERRY

On 16 June 1989, a stroke brought Stan to his final touchdown.

He was introduced to flying as a boy by his brother, who was 17 years older and had his own aircraft and flew it in the Riverina around West Wyalong. His early years were aeronautical, and in 1968, when he moved to Griffith, he took to flying seriously. There was no flying club, but among a small group of pilots he met Warwick Gregory who taught Stan model aircraft flying, and they became constant companions.

In 1971, after a heart attack, Stan's pilot's licence was revoked, and he moved to a BP service station at Engadine. With the Heathcote flying club nearby, modelling took over, and he began to pass on the benefits of his experience to others. One of these was Ken Anderson. After another heart attack in 1977 a by-pass operation was not successful, and a move was made to Long Jetty.

Modelling activities progressed to helicopters, and his engineering skills enabled Stan to produce some big models with chain saw motors. He believed that everybody should be able to fly, and he was a perfectionist with his work, successful as a teacher and as a true modeller.

From a tribute by his wife, Nina.



Stan Perry at the Easter Fun Fli at Albury in 1987.

HALL OF FAME

Paul van Leuven

Paul was born in Indonesia, and his first contact with model flying was the building of a Korda Wakefield from a kit, a gift from his brother. This was in 1941; and due to the Japanese invasion shortly afer, the model was not flown to its full potential, as the teenage Paul was living in a state of semi-internment.

After the war came Indonesian independence, and Paul's family migrated to Australia. In Perth Paul's pastime became model locomotives. One day he purchased a copy of a new magazine called Model News, and as well as model railway articles there was information about model aircraft. Paul was enthused enough to build a number of small rubber powered aircraft, the success of which spurred him on to build a Wakefield to the 80 gram motor weight then current. This was basically a single skein version of Joe Foster's 1953 (unlimited rubber weight) Wakefield. The model was lost in due course, but it inspired the formation of a club, and Paul's acquisition of a set of Frank Zaic's Year Books, to learn more.

In 1958, the 50 gram motor rule for Wakefields came into being, and Paul designed and built a model for these new conditions. As he was exploring new territory he called the design Santa Maria, after Columbus' ship. This model, flown by proxy by Halsetad, won the Traralgon Nationals in 1956, and was ultimately featured in an Aeromodeller Annual. Its successor, Mark 2, again flown by proxy (this time by Ivor F), got third place at the following Burnie Nationals, being beaten only by such first class flyers as Jim Fullarton and Ron Bird, flying in person.

In 1958 Paul moved to Brisbane, but became inactive for a few years while settling into a new home and marital responsibilities. When Paul was ready to get involved again, he found that free flight in Brisbane was almost dead. In 1966, however, he got a letter from Ivor F asking him to contact a Sydney FF enthusiast who had just moved to Brisbane, Brian Parsons. The two of them joined the Beaudesert Club, and just at that time Airborne hit the newstands, with a plan and an article by Alan Edwards of a Wakefield design called Warrigal, plus news of Trans Tasman competitions between Australia and New Zealand. This caught Paul's imagination, and his competitive spirit started him into a golden age of experimentation, research and development. It is these latter activities that justify his inclusion in the Hall of Fame, more so than his contest successes, for his contest successes derive from them.

Paul's research has covered every field of FF model flying: airfoils, airscrews, construction materials, turbulation, invigorators, thermal detection, rubber motor testing, lubricants, winding techniques, structures and more. But, unlike many others, he does not keep the results for his own use, and his articles have appeared in Aeromodeller, Airborne, Model Builder, Model Flying, Free Flight News, Ffonz Newz, Vol Libre and FFDU.

Putting theory into practice, Paul has been on Australia's World Champs Teams on three occasions, and at Taft in 1979 placed second, which is the best Australian Walefield International result since Bond Baker's win in 1958. He has been a Trans Tasman Team Member, Australian National Champ and Queensland State Champ in Wakefield events, with notable regularity.

Paul, due to ill health and age, is currently cutting down his contest participation, but he is still building, experimenting and passing his knowledge on to others. One of his most recent contributions was giving Adrian Bryant (who was away from flying for twenty five years) a one week refresher course before Adrian departed for the World Champs in Argentina where Adrian finished 11th in the event.

Congratulations, Paul, on your award, from all AIRBORNE readers.

from Allen Thomas



Norm Bell winds for a flight with his Roy Wriston Diamond from a 1939 Air Trails. Weighs only 4½ ounces! Beautiful day at the P&DARCS field. John French is in Brisbane, so who took this shot?

Letters to the Edito

Dear Sir,

As Airborne marches stedily towards a unique milestone, its 100th issue, I cannot let pass the occasion of Ron Moulton's retirement without some words of thanks to him from this side of the globe.

Ron Moulton and aeromodelling have been synonymous for thousands of us for more than forty years; a bit over forty one years, in fact. I remember that I was only seventeen when I began to get the Aeroplane Spotter sent from England in the dark days of 1942. Meny issues didn't arrive but I've gathered them since, and now have a full set. I didn't know then that Ron Moulton, only a year older than I, was co-editor.

A little later, like Ron, I volunteered for the Air Force. Ron got in; I failed the medical and had to accept the army. Ron became editor of the South African Airforce Wings. I don't have eny issues, but I do have, and cherish, a full set of Aeromodeller Annuals and a near-complete set of Aeromodellers. It is true that Ron did not become editor-in-chief until both publications were well established, but he held the post longer than enyone before him or is likely to after him.

We'll remember his "Mind the Lines" column, and forgive him the pun; his Elfin 1.8 powered Battler, the first team racer published in Britain; his 1960 Comprehensive Control Line Manual, still useful nearly 30 years later; and his contributions to a splendid series of seven Model Aviation Plans Books 1948-50, with such redoubtables as Peter Chinn, Bill Dean, Ron Warring, HJN

What has eny of this to do with Airborne? Well, it and he and Aeromodeller will be remembered for the dedication by all three, over all those issues, to the world's most creative, challenging, diverse, intellectually and psychologically fulfilling hobby-art-craft-sport! - Aeromodelling, which is not to detract from the value of all other hobbies.

Thank you for your major role in it, Ron. Enjoy your retirement.

Ivor F. VH1

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Letters to the Editor

Dear Sir,

I am a 15 year old who lives in an isolated town in the north-west of Western Australia. I am writing to you concerning your article in Airborne No. 93 (From the Cockpit) and a letter is the same issue.

I received my first radio controlled plane for Xmas in 1988. It was a Cox EZ Bee, powered by a Cox .049. Naturally, being my first plane, it was ARF and a very good trainer.

The reason I am writing, though, is to express my thoughts on the need for people who are first entering the sport to get experienced help. When I received my plane I had it together within 2 hours on Xmas day, and was expecting to fly it on Boxing Day. Boxing Day came and out we went to try and start the engine. It wouldn't start, and I dropped my bundle.

So it was left until the shops opened again and I went to our local Toyworld shop and asked the assistant if she knew anyone in our town who flys RC planes. She did, and this is how I met Lief (pronounced Life). He got my engine started and said that he would teach me to fly. Within a week I was flying solo. Within 3 months I had purchased an Aeroflyte 15 Trainer and I am having a ball. Without the help from Lief this would never have been possible.

Secondly, I am writing about another letter in the same issue, from G.W. Barron, about how many juniors are involved in RC flying. In my town, Newman, juniors outnumber the seniors. There are Lief and Neville, who are the only seniors. Both of these people are sharing their teaching time between 5 or more lads. Admittedly most of us juniors have been interested only since Xmas 1988, but as the word is spread around school, and more and more people come out to watch, more and more juniors are becoming interested. It's worth thinking about.

Yours faithfully,

Roy Warren, Newman, W.A.

Thank you Roy. Your letter made my day! I have sent you something to help you with yopur modelling, and in appreciation of your letter.



This photo from Norm Bell, dating back to the early post-war years, is without a caption because Norm has forgotten who it is. The Editor will send a copy of Giant Scale Aeroplanes by David Boddington to the reader who first identifies the modeller(s), the venue and the approximate date of this photograph. The etiquette of wearing a tie on the flying field need not be discussed!

Dear Sir,

Having read many articles in your magazine about newcomers to the sport of Radio Control being constantly discouraged by crashes, I would like to air my opinions on this subject.

Learning to fly by yourself is not impossible. I myself have had no 'expert' instruction and can still fly rather well. The **only** way that this can be achieved is if you have the right plane. I don't think that any commercially produced kit fits the bill. "Expert help is the way to go" everyone keeps saying, but someone reading this article may not, for some reason or another, be able to obtain this 'expert' help. Here are a few tips for those who must go it alone.

Essential items: strong, slow and stable aircraft; plenty of open space; lots of patience.

The **ideal trainer** is a stable glider with an .049 on a power pod strapped onto the wing, two channel radio (rudder and elevator) and a front end able to stand up to a bit of rough treatment. Another essential is that the plane's tail surfaces are aligned correctly and that there are no warps in the wing.

The most essential essential is that you know the basics of flight: how to make the model climb, dive and turn. The basics can be read about in magazine articles or in books specially written for learning to fly. You **must** have the sequence of events needed to make ypur plane do what you want firmly etched into your brain before your first flight. It may take some time to co-ordinate all movements to make a turn correctly, but you'll get it eventually.

When the big day comes, prepare your plane at home and make sure that you have everything necessary for your flight. The day should be calm and overcast: calm so that your plane doesn't get blown around, and overcast so that the sun won't get in your eyes. Waiting for a day like this may be beneficial in the long run.

At the field, once the motor is started and tuned properly, have an assistant hand launch the plane **into** any slight breeze that may be present. Note that the plane is **launched,** not **thrown,** as a throw will almost certainly result in a crash. Now, using techniques previously read about, guide your plane straight away from you, gradually gaining height until you feel it is safe enough to attempt a turn.

Now that you're up and away, I think that you'll find that in no time at all, if you keep calm that is, you will get used to the reaction of your plane when you feed in a certain control. When the motor cuts, glide the model down and allow it to land itself with no turns down low.

If your first flight doesn't quite fit the above scenario; keep trying. If all else fails and you would really like to get flying, then I suggest that you write to your nearest club and try to organise a day or so when you can visit and get some help from someone who has been behind the controls for a while.

Keep persisting; you'll be glad you did!

Yours faithfully,

Scott Doyle, Greenbank, Qld.

How is Stuart getting along, Scott?

DEADLINES:

Issue No. 96	**8 September**
Issue No. 97	**3 November**

Dear Sir,

It is with interest that I have read the letters concerning aeromodelling at Cootamundra in issues 93 and 94. I know both the writers and of the very worthwhile contribution they have made to aeromodelling over the years. Both Geoff Barron and Roy Cunningham are only too aware of the effort put into helping others, organising clubs and fostering awareness within the community.

I was one of the many juniors Geoff Barron and Norm Roberts helped at Cootamundra during the 1960s. The help embraced all aspects of aeromodelling, and I must admit that in those days, with the gear available, the road to success was not easy. We kept rebuilding and trying, and many of us flew control line, free flight and later radio successfully. With Geoff's help I progressed from single channel escapements to multi reeds and finally built and flew my first proportional outfit, a Remcon 6. Yes, the grounding received there must have helped in my involvement in establishing my current club, the Belconnen Model Aero Club.

I have kept in contact with Norm Roberts and Roy Cunningham. (Roy was a BMAC member while stationed at Yass some years ago.) Although I spoke with Geoff sometimes, he was involved with other activities.

As regards the situation with juniors in my own club, we have many junior members. Some have been taught by fathers, others have learnt radio flying using the RCAS Instructor method. We have recently witnessed a resurgence of control line flying, and the occasional free flight model. Most of our members are sport flyers, building and flying a variety of models, from gliders through old timers, scale and hotter sports aerobatic designs powered by two and four-stroke motors.

BMAC runs a cross-section of events, most aimed at involvement by all members. The annual F3A Aerobatics Tournament is pitched at the competitive aerobatic flyer, however, Sports-

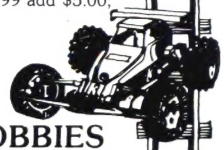
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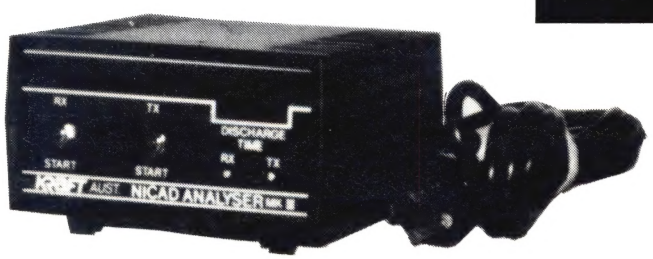
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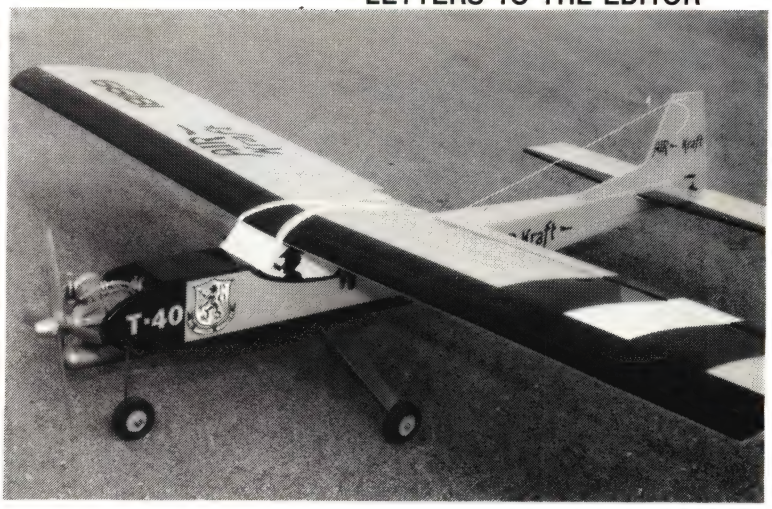
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The Gillott camera catches the Electric columnist with his stubby Bumble Bee at an EF rally. Hmmm. Bees don't know that they shouldn't be able to fly, either!



This ugly duckling is a Model Tech ARF that is docile enough for learning, yet agile enough for advanced manoeuvres like inverted spins! Stu Richmond made it for a kit review, and used a Bolly prop; an 11 x 6 cut to 9 inch diameter! Neat! Says Stu. With a K&B Sportster 45.

man provides an entry point for newcomers.

I consider also that juniors are not as prevalent because of the multitude of other activities that are available to them. These include sports, computer games, videos, and also the aspects of life that destroy young people and their initiatives. Some 25 years ago entry to the sport was via a less costly control line model. This was generally flown at the local park, noise was tolerated, and I suggest that people thought it better to have a bit of noise and at least know where the boys were and what they were doing. Nowadays the cost of starting is upwards of $500 for a relatively simple RC trainer. Also, most radio fields require travel, which mum or dad will have to provide. This must also fit in with other family activities.

Out of all this I guess that the good thing to know is that the effort put into helping those juniors at Cootamundra was worthwhile. There are several who are still modelling to this day. I have derived considerable pleasure, not only from aeromodelling, but also from the many friendships formed over the years. In my own way I hope that I have been able to put back into the sport what was passed on during those early years.

I hope that Geoff does visit and join the Cootamundra club. I am sure that the President and the local members would welcome someone with his background and experience. There are many aspects of our sport which Geoff would find interesting and enjoyable without resorting to highly complex and expensive equipment.

I agree with Roy's comments about keeping up the good work with Airborne. It is a most enjoyable and readable magazine.

Yours faithfully,
Grant Manwaring, MacGregor,

Dear Sir,

When reading issue No. 93 I noticed that most of the Letters to the Editor were concerned with the decline in junior modelling.

I have been a member of the Bendigo Club for five years. I first began flying late in '83. There were two other junior members in the club at that stage, and on my last count two new members were present, along with another junior who was flying, but not with a club.

I agree that cost is always a problem that has to be overcome, but with a bit of planning and extra time in scratch building, a considerable amount of money can be saved. An instructor is also hard to find; not as many people fly at our club as in the past years. I have been instructor to a few juniors, and seniors, and I always find that they are led into buying something bigger and better than they need. Since when has an overpowered plane with a racing engine been considered a trainer? *Too often it seems!*

I recommend to any junior that he try gliding when first learning, because of its minimal cost and easy operation. Most clubs own their own winch or bungee which can be used at any time.

The argument of computer games and the video is no longer a substantial one.

Maybe if we went out of our way a bit more to help new members we would succeed.

Yours faithfully,
Martin Coman, Bendigo, Victoria.

Please read Martin's final sentence again.

Dear Sir,

As a newcomer to aeromodelling, I would like to reply to G.W. Barron's letter in No. 93.

My wife must have thought that I needed a new hobby, as she bought me a 2 channel glider kit. After a couple of months of building it was ready. I knew very little about RC flying so I rang a friend who has RC planes to check the model over and, to my surprise, everything was OK. After that it took me about a month to be able to fly solo and to land the glider without crashing. After several complete rebuilds I now have it down to a fine art. I have been flying solo for over six months, and love it!

I have found that the cost of materials to rebuild, or build from scratch, is becoming very high. I have designed and built my own set of wings for the glider, and the cost to make them was $20 cheaper than building a complete new glider kit.

To fly RC gliders you need a really good hill, and we have plenty here in Orange. I've asked permission from several local farmers and have had no problems with flying on their land. The local RC club is mainly for powered planes, and they are on flat ground, which is not suitable for slope soaring, and membership is expensive. I am not aware of any gliding club in Orange.

Since flying solo I have taken several juniors flying. They all have been interested in flying, but didn't realise that the kits have to be made up by hand. It is a committment if you want to fly. I have flown cheap kits that cost about $60 and upwards, but they are very fast. Beginners are better off starting on something slow until their confidence increases.

Also I have found lately that to get most materials in Orange I've had to resort to the Shop & Service Guide in AIRBORNE, and found that post ordering is quicker than shop ordering.

You called flying a sport: I would call it a challenge. It's not every day that things go right! I've had to sprint to follow my glider after it was blown back behind the crest of the hill. If you don't move you're destined to crash; then it's home for an early shower!

Finally I would like to thank the Old Timer modellers in Nowra for the use of their flying field and facilities while I was on holidays. Hope I can return the favour.

Yours faithfully,
Vince Hagarty, Orange, NSW.

Thank you for your letter Vince. I agree entirely about starting on something slow. In my area there are a couple of youngsters who have the usual 40 trainers, and they get almost no flying because they rely on an instructor; whereas the light and slow group can fly anytime they choose because, once they have managed a couple of flights under supervision they do not need it any more.

Thank you also to Mr. Barron for stimulating such a good response to a key issue in our hobby-sport.

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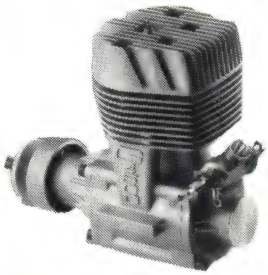
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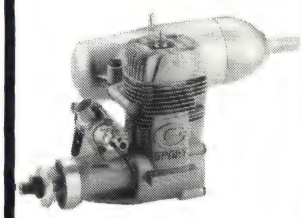
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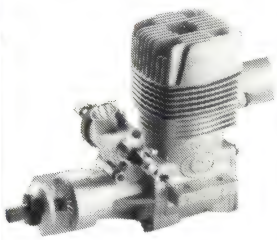
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Police officers use their radar equipment to measure airspeed of the models at the Dalby power fly-in back in April. Results included 43 kph for Roy Dray's Blackburn (downwind, perhaps?), 73 kph for a chopper and 166 kph for a pattern ship. Report and photo from Barry Harth.

Mel Gillott's ON RC

ENGINE PREPARATION

My first topic this issue is an in-depth look at getting the best performance out of our internal combustion engines. The discourse will apply mainly to competition modellers who demand 100% power and reliability from their prop swingers, but it should also be of use to the more fastidious sport flyers, and of general interest to all.

The days of the Speed Secret are more or less gone. Today's engines are available in configurations to suit any purpose exactly, with designs evolved from many years of experience. The requirements for a strong engine are:

1) Properly fitted piston and liner;
2) Free-running crankshaft;
3) Accurate cylinder head fit in the liner;
4) Feeding of the right amounts of fuel and air.

There are, however, some areas, such as manufacturers' machining tolerances and minor assembly errors, that the user, if suitably educated, can detect, minimise, and sometimes correct or improve.

In The Shop

Engine preparation does not begin on the field, or even in the workshop. It begins in the model shop before you make the purchase. This, of course, rules out mail order purchase. When choosing an engine look at several examples, if possible. With the piston off compression, carefully feel for any roughness or drag during rotation. Not only does this tell you how good the machining tolerances are, but also if any swarf is present in the motor. If the latter is the case, then you or the previous handler of the engine may have already damaged a critical sealing area.

Position the engine under a good light source and look through the exhaust port for any scratches in the liner, and also on the skirt of the piston. If the motor has no piston ring, take careful note of the top few millimetres of the piston. Ideally you should see a narrow band that is more polished than the rest of the metal. This is where the piston seals at top dead centre. This band should be consistent in width and in colour. An uneven ring shows that the piston or liner is not perfectly round, leading to loss of seal and, hence, power. Unfortunately, unless you make like an insect, you won't be able to see all round the piston!

If the engine passes these tests, and if you are still friends with the shop owner, remove the glow plug and turn the engine slowly to top dead centre (TDC). With an ABC type engine you should feel a distinct grab as the piston approaches TDC, and it should take quite an effort to turn past TDC. If it is impossible to turn over TDC whilst grasping only the prop driver, fit a propeller just to make sure that the engine is not too tightt. A good ABC should be difficult, but not impossible, to turn over when new.

A motor fitted with a piston ring is a different kettle of fish, as compression can vary a lot depending on the marque. In this case just check for smoothness around TDC and at least some signs of a compression seal. Reject an engine which has noticeable movement of the ring in its groove.

If the engine passes your intense scrutiny and all the above tests, then do the shop owner and yourself a favour and buy it.

In the Workshop

With your newly-acquired pride and joy at home, it's time for the serious stuff. With the correct tools at hand, and a clinically clean work surface, you can void the warranty (please note!) by dismantling all the bolted components of the engine. Mark components such as the con-rod and cylinder head to ensure correct re-assembly. Most modellers have difficulty removing the liner and the bearings, so it is worth dwelling on the necessary steps.

1. Removing the Liner. Needless to say, you should not use any metallic object to pry the liner, nor use a vise to hold the liner or the crankcase. Try placing a hardwood dowel through the top of the sleeve, angled into the exhaust port. Then rotate the shaft, using little force, and hopefully the rising piston will push out the sleeve. A more stubborn liner will necessitate heating of the case so that it expands away from the liner. I usually play the flame from a propane torch evenly around the case, but others prefer heating in an oven at about 150°C for five minutes.

Extra care must be taken with the piston, particularly if the con-rod is to be separated. Mark inside the skirt to aid re-assembly, as many pistons are not symmmetrical. Remove only one circlip, if applicable. If the engine has been run this must be replaced with a new one. Store the piston carefully whilst working on the rest of the motor.

2. Removing the Crankshaft and Bearings. The shaft should just about fall out of its bearings. If it doesn't, screw on the prop-nut and **gently** tap out the shaft with a mallet. Wrap a rag around the cylinder portion of the crankcase or, in the case of a removable front end, around the shaft housing, and hold firmly whilst the casting is being evenly heated with a torch flame. When hot a few taps squarely on a wooden bench and the rear bearing should fall out. The front bearing may need persuading with a wooden dowel inserted from the rear. Painful!

The dismantled parts should then be rinsed in a bowl of solvent. This should remove any foreign matter that may have found its way into the innards during manufacture. Lacquer thinners is a good solvent, or metho, or one of the proprietary cleaners; but watch that it doesn't dissolve any plastic parts. I use petrol, but am loathe to recommend it because of the dangers of ignition and harm to the skin. Remove the parts from the solvent after cleaning with an old toothbrush, then rinse in clean solvent, particularly the ball races. Note: never spin ball races when dry. Spray all components with a mist of WD40 or similar, and place on a clean paper towel. This finicky attention to cleanliness may seem like an overkill, but it isn't if you are after a long-lasting, top-performing engine.

Under the Microscope

Now is the time to carefully look over every part to see if we can improve on the factory. Don't expect to find many faults: today's machinery and quality control ensure that the consumer usually gets a good product. Okay; I realise that this may not apply to many new motor cars, but our miniature engine makers don't often get it wrong. However, the expediencies of mass production dictate that perfection is rarely achieved.

We are not going to modify the motor; just tidy things up a bit.

Inspect the interior of the crankcase for flash and sharp edges around ports. Check for any high spots or rough edges where the liner slips into the case. Clean up any imperfections with a sharp No. 11 knife blade and/or 600 grit wet and dry paper wrapped around a finger or a

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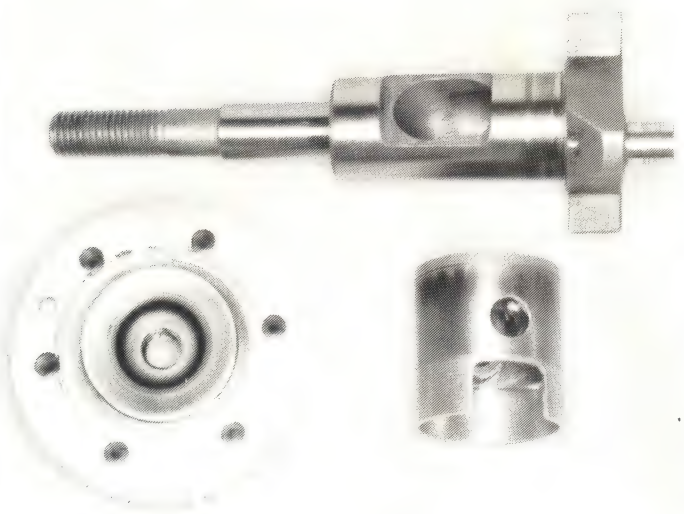
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Critical areas in model engines: a free-running crankshaft; good piston-liner fit; and accurate head fit in liner. Engine Preparation tells how to get the most out of your modern glow motors. MG pic.



The same principles apply to all engines, but some, such as this Cox Queen Bee, reviewed last issue, are not amenable to much porting and polishing for performance gain, but still benefit from careful cleaning for each new flying season.

dowel of the requisite size. Spraying some WD40 on the paper will help the fine finish. Needless to say, one should approach this job more like a surgeon than like a butcher.

Inspect the inside of the backplate to see if the crankshaft or con-rod is rubbing. If the tell-tale marks are there, rub the backplate on the wet and dry paper on top of a flat surface such as a hand mirror. When hand polishing on a flat surface, move the job in a figure of 8 motion for best results. You can also cure the rubbing problem by fitting extra gaskets to the backplate. (Don't anyone dare write in and tell me that the extra case volume will affect performance. I am convinced that the volume of the lower case has a negligible affect on horsepower.)

Take a close look at the crankshaft. If it is a shaft inlet engine the gas passages should be smooth. Any corrections will have to be done carefully with a small grindstone in a Dremel tool or similar. There is usually scope for gas flow work in these areas, such as putting a radius where the gases exit the shaft, but I wouldn't guarantee any performance gains. Most gains will come from correcting an obvious burr or other machining imperfection in the passage.

Similarly, the cylinder liner, head rear rotor inlet (if applicable) and other components should be scrutinised, and any remedial work carried out. Any metal removal must be followed by cleaning and oiling.

Re-Assembly

This step is often under-rated. By systematically putting the engine together, with careful fitting of critical parts, some significant performance gains may be had. Nowhere does this apply more than with the crankshaft-bearing assembly.

Put the ball races into the freezer for at least 10 minutes. (Make sure that they are not forgotten - they don't go down too well in the family meat pie!) Heat the case in the area of the front bearing, slip the cold front bearing onto the crankshaft and use the shaft as a tool to insert and align the bearing in its case. Remove the shaft and use a mallet and a properly sized socket (from a socket-wrench set) placed against the front of the bearing, to fully seat the bearing in the case. Tap gently; don't bash!

The procedure for the rear bearing is similar. Since access may be restricted inside the case, use a wooden dowel to tap the rear of the crankshaft to seat the bearing. Remove the shaft and, once again, use the socket to fully seat the bearing. At no time force the bearing into the case. If it doesn't go in fairly easily and quickly, the only solution is to re-heat and cool the bits and start over again.

When all is right, slip the shaft into the engine and give it a spin. It should rotate very freely, slow down smoothly, and finish by rocking to and fro. If this is not the case there are three possible causes. 1. You've done a hopeless job and the bearings are still not clean (or they may be RS). 2. The bearings are not quite aligned. This can usually be fixed by bolting on a propeller, re-heating the case in the area of the bearings, then tapping and spinning the shaft. 3. It is possible that the area between the bearings is rubbing on the shaft. This can be remedied by removing the bearings then polishing the aluminium bore with fine wet and dry paper wrapped around a dowel of diameter just less than that of the bore. Again, be careful - the shaft has to seal in this area whilst at the same time not causing any drag. If the shaft is still not free, you have a problem that should have been found before you took the motor home.

Once satisfied with the crankshaft area, the same precision must be applied to the installation of the liner into the case. The aluminium case will usually have to be expanded by heating, and the liner contracted by cooling, in order to make accurate assembly possible. We are trying to give ourselves sufficient time to slip the liner in and rotate it to the exact position. It is important that all the ports line up. Sometimes you may have to resort to careful metal removal to achieve this, but remember that any metal removal from the top of the ports in the liner will change the timing. Epoxy putty can be used on the aluminium case to fill in any over-machining by the factory, but use only the best quality: you don't want bits of plastic floating loosely around in the engine!

We now need to achieve replacement of the piston and ring without breakage or scratching the soft piston skirt. The method depends upon the design of the engine. If the piston-ring-conrod assembly cannot be removed and re-assembled with the liner in place, the lower edge of the liner should have a large internal chamfer to aid in inserting the piston (and compressing the ring if applicable) from below. This entails placing the piston assembly onto the crankshaft and steering the piston into the liner as the liner is inserted into the case. This can become tricky, especially if the case needs to be heated. Patience and care are necessary.

The other situation occurs when the piston assembly is inserted after the liner is in place. Here it is a case of dropping the piston in from the top and carefully compressing the ring whilst applying gentle pressure to pop the piston down. I usually get by with finger-nail pressure, but for nail-biters you can try using thin ply or an old credit card as a tool.

There are variations on piston re-assembly according to engine design. Briefly: a non-ringed engine **must** have the piston inserted from below the liner; an engine with a removable front case gives you several choices of assembly - pick the easiest; and at the other extreme, some motors must have the piston pin removed (and later replaced) whilst the piston is still in the liner. There will be a hole in the liner and case for this purpose. The gudgeon pin must be lined up with this hole, and something akin to a bent pin used to pry out the hollow piston pin. Good luck with this one!

Downhill Run

If you've got this far the rest should be a breeze. Before sealing all the big holes, oil all moving parts of the engine. Re-install the cylinder head, then tighten the bolts using a crossing pattern. Heads must not be over-tightened; they can easily distort and/or crack. I use an Allen key the wrong way round (holding the short end) so as not to exert too much force. The head seal will be accomplished with the soft head gasket, not be excessive pressure.

If a taper collet is used to hold the prop driver, ensure that this is pushed fully rearwards on the crankshaft (and that the shaft is all the way forwards) before fitting the prop driver. Fit a propeller, and hand crank the engine to see how it feels. You now know what to look for, and it should feel good. If not, then it's back to square one. Install the backplate (you should make a

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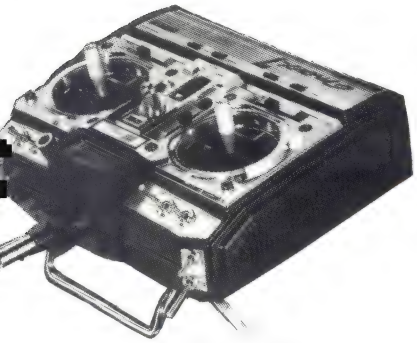


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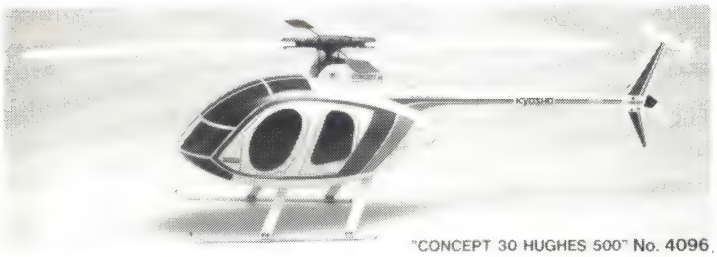
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habit of using the crossing pattern when tightening any set of bolts), carby, muffler and any other fixtures, and you are in business.

Running-In

After taking all this time and trouble, it would be criminal not to finish the job by proper running-in. I know that bench running is not the flavour of the month, and that most of us get by with bolting our new precision machine straight into a model and flying. This is fine if near enough is good enough, but deep down we know that it is that little extra attention to detail that separates the top guys from the also-rans. Besides, you will be rewarded with longer engine life, better performance, and engine familiariy before venturing to the flying field.

Despite the above, I do not propose to give an explanation of running-in procedures. That's been covered many times before, and if all else fails one can always turn to the instructions that came with the engine. Usually the manufacturers know what they are talking about, so take heed.

Engine preparation, as outlined, is not difficult or beyond the capabilities of most modellers (butchers should give it a miss). Even if a performance gain is not sought or achieved, the satisfaction and education in examining our highly developed miniature engines should be reward enough.

I recently applied the procedures outlined by Mel to an apparently dud 3.5 cc diesel, and obtained a performance boost that matched the world famous name of the engine.

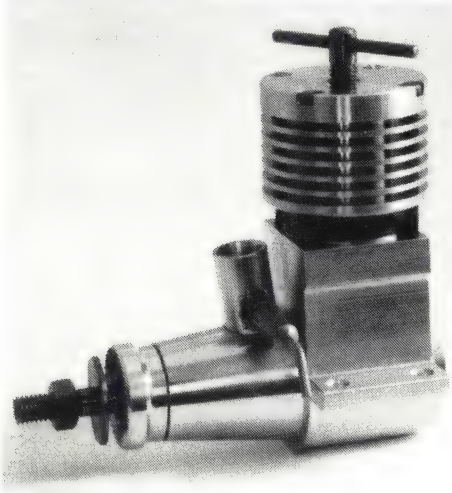
MATE MATERIALISES

First revealed in the Engin-ear's column two issues ago, David Owen's MATE design is now ready. This new engine is significant for a couple of reasons. It's the first Australian engine since the demise of Gordon Burford's Taipan range, and the world's first DIY engine plan and kit available with an extruded crankcase.

Before I go any further I should stress that this 2 cc diesel cannot be bought over the counter; you have to make it yourself from plans or a kit of materials available from David.

A photograph of the prototype is shown hereabouts. Yes; it is beautifully built as per the Owen trademark, and yes; it does look a little like an Oliver Cub, although this wasn't the intention.

I'm not an engine fanatic (there, I've admitted it, Winchy!), but was privileged recently to see the Mate running, and was suitably impressed. So, too, was David, as the engine started easily, ran smoothly, and was quite powerful. These are secondary benefits from a project that is primarily intended as a means of self satisfaction. It's enough to make one rush out and order a new metal scratcher, or whatever it is they use to make these things! The aluminium crankcase extrusion, full drawings, comprehensive instructions and a kit of the correct materials should be available in late Sepotember. As is usual from this source, the quality will be impeccable. Send an SASE for details to David Owen, P.O. Box 264, Fairy Meadow, NSW, 2519.



Do you fancy building an engine? David Owen now has available parts and drawings for this 2 cc diesel. Become a real engineer with this excellent design.



Gary Sunderland won the best OS-powered aircraft trophy at the OS 4-Stroke - Pilot Fly-In, with his OS 90 FS powered DH4. Calm weather was just right for this popular event. Photo: A. Farnan.

DOCUMENTATION OUT OF FOCUS

Readers that have managed to stay with us for a few years may remember the documentation source information that I used to provide. Richard Traill from North Balwyn in Victoria wrote asking if I still provide the service, and listed a couple of aircraft on which he needs information. To Richard, and all other readers, let me re-iterate that I am always happy to try to answer your queries, but for aircraft documentation you are much better off going to the professionals. If you need photos, 3-views or any other information on a particular full-sized aircraft, expert services are available at a reasonable cost. Scale Model Research, run by top Aussie modeller Warwick Gregory, is one such service, and his catalogue is well worth sending for. Check out the S.M.R. ad in AIRBORNE.

GLUING CANOPIES

In the same letter, Richard thought the Focus Index was a great idea (thanks Dick), and commented that he had used it twice already.

He also had a problem: "I cannot manage to get plastic moulded canopies to stay on my fuselages. I normally tissue then paint the fuse, and then glue the canopy on. Epoxy is normally a browny-yellow colour, which looks awful, and other glues melt the plastic or don't adhere. The edges of the canopies are normally roughed-up to aid adhesion, but they still fall off with tedious regularity."

Your method is about right, Richard; it's just your choice of glue that needs attention. It's an old problem that many modellers have faced. You will have to buy a special adhesive for this job. The old stand-by is Wilhold RC 56, but more recent products are PIC Flex White, PIC Plasti-Stic and Poly Zap. The first two are water based glues, and I have used them both wth success. The only thing to watch out for is that they do not dry hard (they flex with the canopy) and therefore cannot be sanded. The last two are cyanoacrylates, or super glues, which I have not tried personally but I have heard good reports about them.

Needless to say, the canopy must be a reasonably good fit on the fuselage to give the adhesive a fighting chance. A carefully cut groove in which the canopy can sit helps locate the plastic and hides any irregular joint. If the model is tissued but not colour painted, a further strip of doped-on tissue may be placed around the canopy to help hide the joint. The model can then be finished with the normal colour coats.

TWINS

by Ron de Chastel

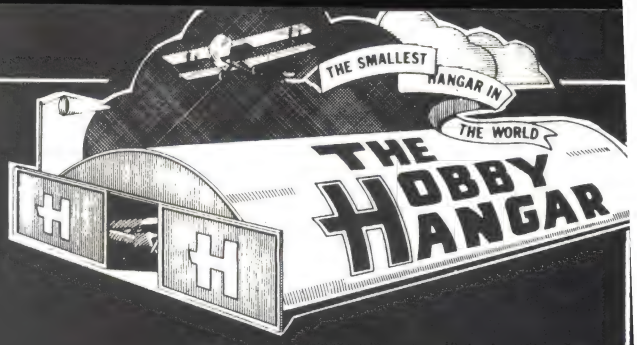
Who'd have 'em? Too complicated; not worth the time and effort; too risky to fly; what if one motor stops? So the comments go from those who haven't had them. Well, I have a passion for twins; the aircraft variety, that is, not the result of marital bliss.

It started with an early kit of the Cessna 310 with twin 35s and about a year of building. This model served me well, if only for a short time. It certainly was a show stopper in the early times, quite reasonable as a scale model but with very little detail, Solarfilm covered, and very reliable. It disappointingly came to grief on a very windy day in Maryborough. Wind under a large wing and sluggish responses do not go hand-in-hand. It was really not too complicated; well worth the time and effort; and still flew reasonably with one motor stopped. The secret with twins is to always set the motors on the rich side and to be prepared to cut power instantly if one motor is doubtful.

Next was another kit job, an MRM B25 Mitchell again with OS 35s. This one was built with more finesse, and had an acrylic finish. An excellent flyer and a model that gained quite a few competition places. It became a hack flyer, such was its reliability: just stoke it up and take off. As docile as a trainer and, once again, if one motor quit just throttle back and glide home. It would fly with one motor dead and the other at full revs, but not comfortably.

Then came the more ambitious Gloster Meteor. Twin Rossi 81s and Byro Jet fans, and T tail. This model was a breakthrough in design and development, both in the power plant department and in construction. A lot was learned from this

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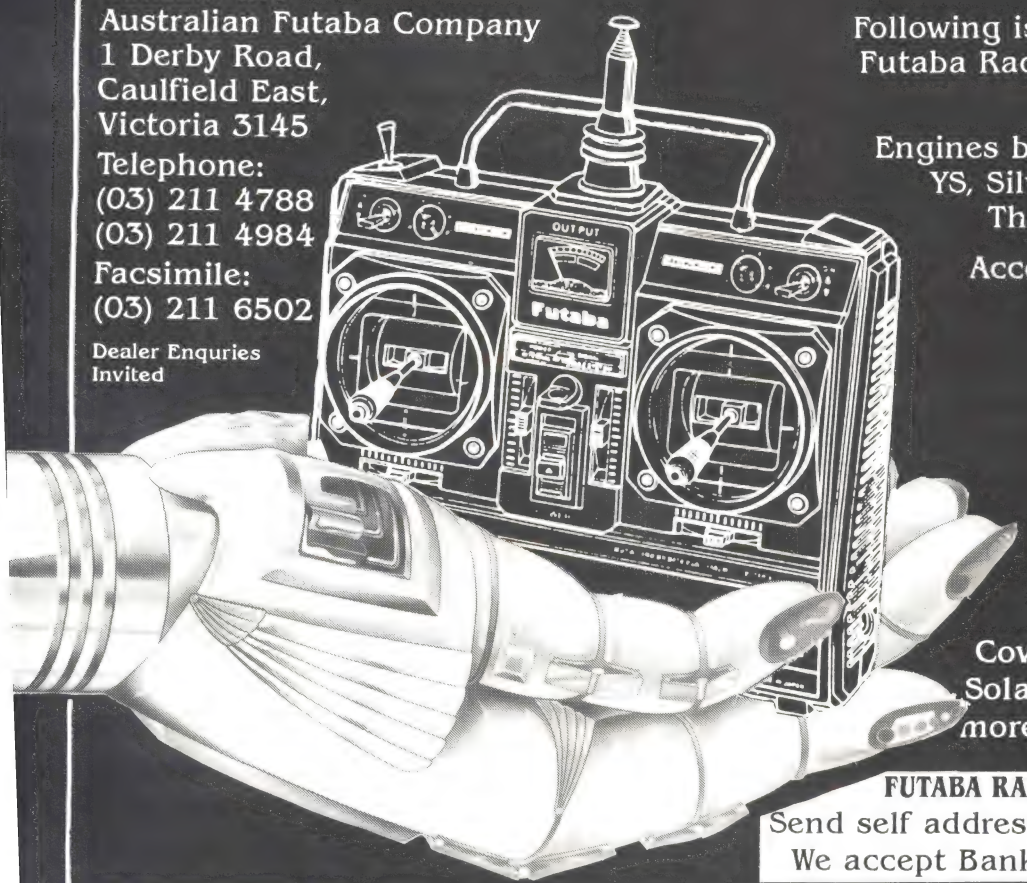
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machine, and although it eventually flew well, it was always a handful. Quite heavy at 26 lb., it took up a lot of room to land. Nevertheless, it would loop from level flight and do nice rolls etc. A good display model, and a good example of ducted fan models. All the above have been shown in AIRBORNE over the years.

The model depicted in this article has just been finished and flown. In looking for a new twin quite a lot of aircraft were considered. DH Mosquito; very nice, but often modelled here and overseas. DH Hornet; again nice and fast, but also well modelled here and overseas. Beaufighter: tubby and full of character, and no doubt very manoeuverable; didn't like the radial motors. Some civilian twins were also considered but none had the aerobatic qualities that I was seeking. (Not in a scale manner, anyway.) The lesser known Westland was looked at and considered as a prospect: distinctly different from the conventional; angular wings; rounded, almost parallel fuselage; T tail; and with a lot of character; aerobatic and fast; and not too well known or previously built to the chosen scale of 1/6.

This scale came out at 90 inches span, or for the modern fraternity, 2.286 metres. Power selected was the beautiful Super Tigre 90 two-strokes. These motors, with their removable front housing, allowed the crankcase to be reversed on one motor, permitting both mufflers to be positioned on the inner side of the cowling. The ability to turn large props at moderate revs was also a consideration. Graupner 14 x 7 three-blade props were tested and settled on. This maintained a scale appearance on flying props. By fitting a throttle barrel sleeve, choke area was reduced and fuel suction improved. Top revs are just under 9,500 each. No difference detected by reversing one crankcase.

Construction is in the usual manner: lots of planking on the fuselage; foam core wings which have plug-in outer panels; balsa built-up fin, rudder and tailplane. Elevator linkage was a bit of a pain, each half elevator having its own servo working pull-pull wires to a crank built in the lower fin. The elevator and upper fin are also removable for transportation. Undercarriage is retractable using a converted Rhom Air unit for the tail wheel and JM Innovations mains, modified for 105º retrtactable angle. Of particular interest is the large Fowler Flap. Stretching from outer wing panel to outer wing panel, this flap is pivoted at each lower rear engine nacelle, and moves out and down in one piece, actuated by a high power servo on a proportional channel. A cursed thing to set up, but very effective.



Ron de Chastel's Westland Whirlwind in the tender care of wife, Irene, Ron's expert helper and supporter. They have demonstrated the Cessna 310, the Mitchell and the Meteor in many places in an exemplary manner. May the Whirlwind serve them as well.

The wing centre section, motors and so on bolt onto the fuselage (or is it the other way round?), and comprise the bulk of the 8.5 kg weight of the machine. All in all ten servos do their job;, 2 being linked together for throttles, 2 for ailerons, 2 for elevators, and 1 each on flap, retracts, rudder and tail wheel door. Naturally a large capacity battery pack is utilised. Radio is JR Computer Apex.

Handling characteristics are different from usual. There is very little rudder effect at low speeds, like trying to keep straight on a slight cross-wind take-off; and no slipstream effect on elevator at all, which makes the landing flare very soft, but very docile in flight. Moderate at top speed and with a landing speed similar to a good pattern model, it shows promise of being a good and reliable model.

Generally it is wise to set twin motors with outward thrust, a little more on the right motor than on the left one. This deflects the slipstream towards the rudder, giving a stabilising effect if one motor goes dead. However, in this instance I considered that it would not be of any help, and both motors were set at zero side thrust as per the original prototype. Slight down thrust is employed, and on test this seemed to be quite adequate.

As mentioned earlier, it is always opportune to set both motors on the rich side prior to flying. I have found that in some cases harmonics of two motors synchronising will cause fuel tanks to froth or foam. By running rich all that happens is that one motor will run leaner, but will keep running. If the motors are set at all lean this condition may cause one motor to run too lean and stop.

Trying to get both motors to run at the same speed throughout the rev range is not necessary. In most cases the model will fly with one motor stopped, so a small amount of speed variation throughout the range is not important. It is important, though, that both motors run well, even at the low end, and that they respond as equally as possible.

The sound of a twin flying past is one of its own. With motors running in and out of sync, it really sounds great. Have a go with a sport model first, and set the motors quite close together. Easy to do, and a lot of fun.

For the technically minded readers, the following statistics show the relationship of my model to the full sized prototype.

WESTLAND WHIRLWIND
Designed and flown in 1939
Span: 45 ft;
Length: 32 ft 3 inches.
Wing Area: 250 sq ft;
Weight: 10,356 lb.
Wing Loading: 4 ln per sq ft.
Power: 2 Rolls Royce Peregrines, 885 BHP each.
Speed: 360 mph at 15,000 ft.

MODEL
Designed and flown 1989
Span: 90 inches;
Length: 64½ inches.
Wing Area: 6.944 sq ft (1,000 sq inches)
Weight: 18.7 lb
Wing Loading: 2.69 lb per sq ft
Power: 2 Super Tigre 90 motors
Speed (Est.): 65 mph

Model depicted flew with RAF Squadron No. 137 1942-43, and survived the war only to be scrapped in September 1944. No Whirlwinds survived, all being either war casualities or scrapped.



Aerobatics ace, Cliff McIvor, holding Les Heap's Barnstormer at the OS-Pilot Fly-In. Photographer Farnan reports that any similarity between the pilot in the cockpit and the modeller holding the aircraft is deliberate, as Les Heap has named the dummy pilot 'Cliff'. The real Cliff seems to appreciate the honour of having an alter ego!

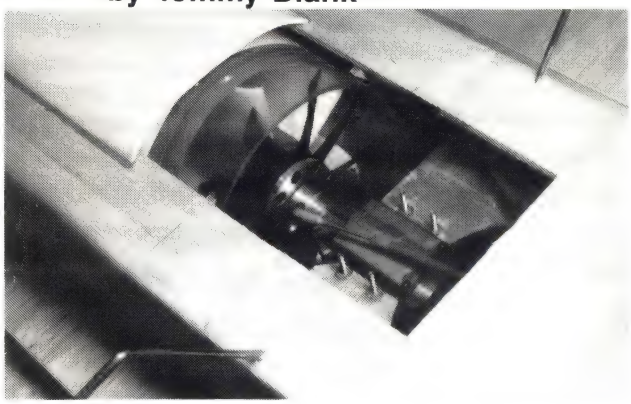
KIT REVIEW

Regal Eagle; from Parkinson Kits

by Tommy Blank



Left hand side wing box with fuel tank installed. Main undercarriage leg is in top left corner.



The throttle hook-up and engine mounting accessible through bottom hatch cut from ABS molding. Fan shroud is clear plastic.

Introduction

The Regal Eagle is a ducted fan sport scale model for 10 to 15 cc engines. It uses balsa and ply for the fusellage and tail, with foam wings and ABS moldings for the tail cone and belly pan. The specified fan size is 150 mm, such as the Byron or Vector, and at about 3.2 kg the Regal Eagle can be flown with a standard 10 cc engine with muffler. The weight can be taken to 4.5 kg, when a 15 cc ducted fan engine with pipe will provide good performence. A fixed undercarriage is provided and may be replaced with retracts. Hardware is included in the kit.

CONSTRUCTION

Fuselage

This is built over the plan in two sections. The fan unit has to be built first, as it becomes part of the structure, and the two fuselage parts are then joined. Holes for push rods must be drilled before top and bottom sheeting are finished. The ABS moldings are joined and attached to the framework with gap filling cyano-acrylate glue, and secured with a strip of glass fibre tape. The tailpipe is rolled from a sheet of thin white plastic joined with acetone.

Some sanding is required to get the right shape to the fuselage, and I would recommend a hatch under the fuselage as well as the one on top, so that the engine mount is fully accessible.

Wings

The cores are in two sections to fit in the kit box, and need to be joined with epoxy glue. Each panel is then sheeted with 1.5 mm balsa, the edges and tips added and then shaped and sanded smooth. When being attached to the fuselage, alignment dowels are used as a guide, but check thoroughly to ensure that the wings do line up exactly. The joint is then re-inforced with a strip of fibreglass cloth and epoxy.

Fuel tanks were placed one in each wing, with a connecting tube between them. The tanks are boxed in, so the plumbing has to be correct and secure before completion of the fuselage.

Tail Surfaces

These are made from 6 mm balsa, and need some sorting out, as the shapes do not match the plan. The elevator halves are driven by twin pushrods, and the rudder can be deleted unless the model is for aerobatics. The rudder servo is used for the nose wheel only on the sport version.

Radio Gear

There is plenty of room, and the radio gear is easily accessible from underneath through the hatch in the front fuselage section. With a fixed undercarriage I would recommend that the battery be located in the nose cone so that extra nose weight is not needed. This may require a hatch for the battery. The receiver is also forward of the servos, which are all together.

Finishing

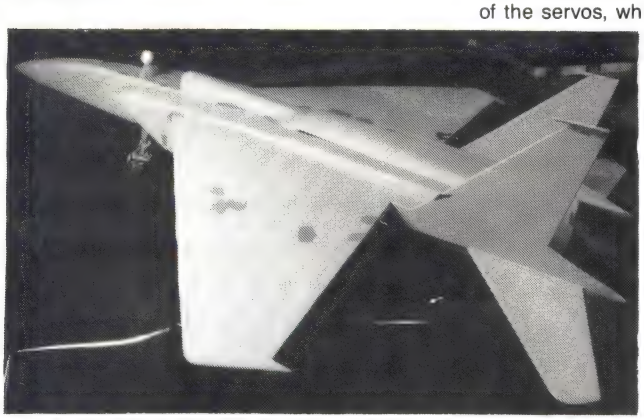
The Regal Eagle was covered with 25 gr per sq m glass cloth and epoxy resin. This gives a strong, smooth surface if applied properly. *(See Ken Draper's glass fibre covering technique elsewhere in this issue.)* The model was rubbed back with 280 grit wet and dry, PIC filler was used around the joints to give smooth fillets, and pinholes were filled with quick stop putty. A gray acrylic primer was sprayed on and rubbed back.

The colour coats were acrylic lacquer, and ultraclear was used as the finish coat. This may not be completely fuel proof, but is quite satisfactory if no raw fuel is spilt on it. A matt or satin finish may be used if you wish.

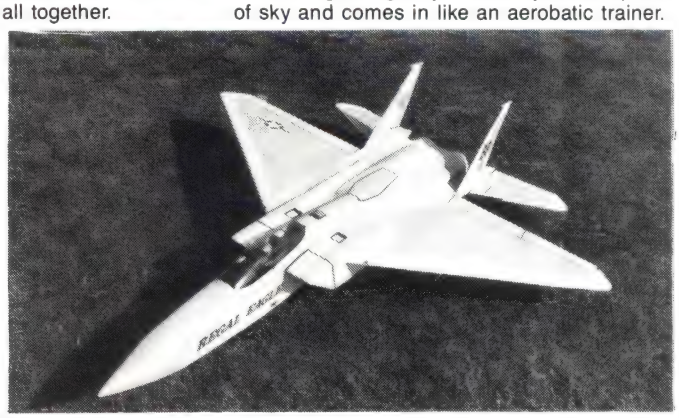
Conclusion

Being a built-up aircraft, the Regal Eagle requires a bit more work than some molded kits, but it is worth the extra effort because the result is very strong and still not heavy. Covering with iron-on film would result in a lighter model with some reduction in strength. Since the lighter versions need only a standard engine with the Vector fan unit, the Regal Eagle is within reach of most modellers; whereas the cost of a DF engine and pipe may not be. The Vector fan is a pusher that turns clockwise, and the engine changes needed to get correct rotation are shown in the kit.

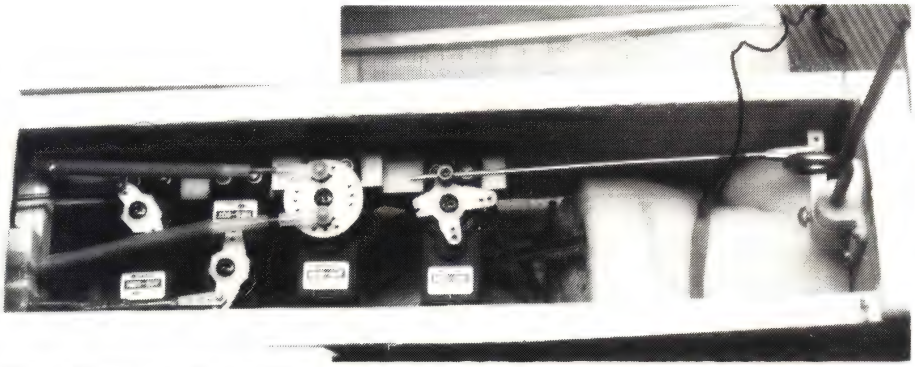
The Regal Eagle flys smoothly, takes up lots of sky and comes in like an aerobatic trainer.

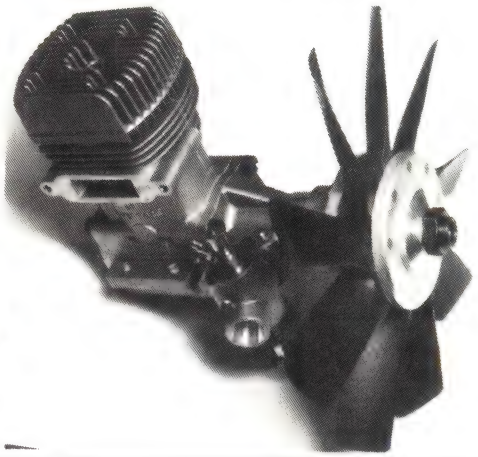


The Regal Eagle after filling and primer have been applied. A large but compact model.



The Regal Eagle ready to go. Many have been built and flown here and overseas. A good introductory model to Ducted Fans. Photos from the reviewer.





Servos on common rails in radio bay. Nose steering but no rudder connections. Large intakes enable good air supply for a powerful DF engine if used.

Right, the Super Tigre 75 with Vector pusher fan. Engine front housing rotated 90° for clockwise rotation. Nine blades on impeller is a high number.

CLASSIFIEDS

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P-38 LIGHTNING CONSTRUCTION continued

by Ken Draper

SCALE CALCULATIONS

In AIRBORNE No. 92, the fourth paragraph on page 33 had an error: a 'not' instead of a 'now'. It should have read ".... for any scale detail that I add to the model, I will state the dimensions. Your will now be able to calculate them for yourself, even though they are not part of the kit information. It is up to you to decide how far ...".

A simpler method, not needing percentages, is to use a machinist's steel rule marked in thousandths of an inch, rather than metric, and the scale 3-view or drawing. If the drawing is 1/20 scale, then measure the detail item, multiply that by 20 to get the size of the item on the full sized aircraft, then divide that by the denominator of the scale of the model. For example, for a ¼ scale model divide by 4.

Correct placement of the detail item on the model is found the same way: by measuring its distance from two good reference points; for example, the location of a fuel filler cap from the leading edge of the wing and from the side of the fuselage. Using the same calculation for each measurement (scale distance x denominator of scale of drawing ÷ denominator of scale of model), obtain the distances for the model and mark in both lines. Where they intersect will be the position for the filler cap. This method works for every detail, from panel lines to insignia.

COVERING WITH GLASS CLOTH

I am going to jump ahead here, for the benefit of people who are currently working on a model; and are about ready to fibreglass their wings. I have had people ask me to interject at this point, if I would, and tell them my easier method of glassing wings; that saves about a pound or more or less weight, depending on wing size, and a whole lot less sanding. Firstly I will talk about the glass cloth I use; and which is available from Aerial Advantage in Adelaide. I use Dan Parson's 6/10ths. of an oz cloth: it is the lightest glass cloth available, and unlike the heavier ¾ oz. cloth and so on up the weight scale, it does not develop crease where it is folded. I would like to mention here that one of the main advantages of the of the 0.6 ounce cloth covering method is the absolute elimination of any sign of overlap joints and small wrinkle overlaps. I am sure that a lot of you have just about pulled your hair out by the roots, to come back to a freshly glassed wing to check it, only to find that the glass has delaminated from the wing surface along a previous fold in the glass cloth (memory) or you couldn't get the wrinkles out on a tight compound curve without cutting away some of the cloth. I have. This just won't happen with this cloth. You have got to see it to believe it. But, quoting Dan Parsons, "The real bonus is there is no need to apply a narrow section of heavy (4 to 6 ounce) cloth to the centre section for re-inforcement which causes a bad hump which is very difficult to blend into the wing contour." Just make a large overlap of the 0.6 ounce cloth on the centre section carrying the overlap just past the wheel well cutouts on wings with retract gear, otherwise a six inch overlap is sufficient. This will be stronger than a single strip of 2 to 4 oz cloth in the centre section.

Now for the main weight-saving hint of the day. I use nitrate dope instead of resin, in applying the cloth to the wing. This is a tried and proven method and ends up every bit as strong as resin-glassed wings but with less than half the work or drying time. It is most important, however, that this method cannot be used straight over the foam. The foam must first be sheeted; i.e. balsa covered, with the sheeting put on with epoxy, which acts as a barrier between the balsa and foam; against the nitrate dope reaching the foam. it will dissolve foam. What happens is the nitrate dope penetrates the balsa sheetng and anchors to the epoxy, making the glass cloth, balsa and epoxy one solid lamination: very, very strong.

You simply lay on the glass cloth, dry, on the wing, and starting at the overlap at the centre section brush on the dope with a soft brush to tack that end down; then brushing in spanwise strokes apply the dope until you reach the wing tip, laying down a smooth thin layer of dope on the cloth. Do not try to fill the cloth at this stage and do not sand after it has dried. Next, after it has dried, mix talc powder with some nitrate dope to make a filler for the cloth, applying this the same was as before; filling the cloth completely. When this has dried it can be sanded smooth; take extra care here as it sands very easy and you don't want to sand into the cloth fibres. I then put on one final thin sealing coat of dope and sand that very lightly for a smooth finish before I apply my paint primer.

Not that it should need mentioning; but for the benefit of the first timers; in order to get that final glass smooth finish, the balsa sheeting on the wing, prior to covering with the cloth, must have any seams, nicks etc. filled and sanded back for a smooth overall finish. A good product, which I like to use for this chore is NHP Microfill. The nitrate dope which I use, and is available from the aircraft parts supply houses at your local airport is Randolph #210 H.S. as it already has more fillers in it. It comes in 1 U.S. gal. tins, this amount costing at around $50.00, while seeming expensive, will cover a lot of model wings, making the cost per model very inexpensive. A complete cloth covering information packages comes with each order of 0.6 ounce cloth; giving suggestions on how to apply the cloth, overlap amounts etc., as well as all the different resin, dope products that can be used. It is full of hints and techniques that can make glassing a wing problem free.

That is my method of covering wings. It is very strong and is as light or lighter than any other method, with the exception maybe of the plastic ironon coverings, which are not as strong or as durable. The applicatioon is not only retsricted to wings, but works beautifully in covering complete balsa sheeted fuselages.

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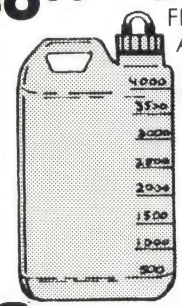
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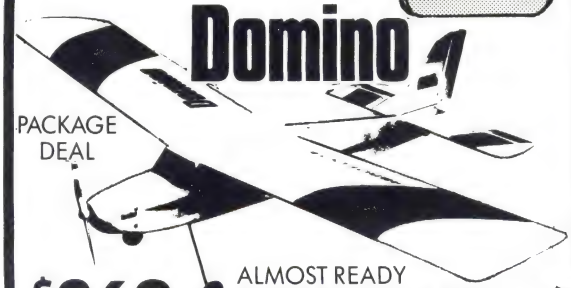
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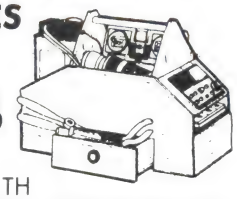
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SHAPING UP

by Peter Hardy-Atkins

In the latest of his articles on lightweight construction techniques, Peter Hardy-Atkins extends his foam sculpting technique to wings.

The Impossible is Quicker

There are some things that do not quite work out with conventional foam core cutting, and the Spitfire wing is a very severe test of this hot wire process. I'm not saying that it can't be done; I simply think that the effort involved produces no benefit. Those lovely elipses on the leading and trailing edges are fundamental to the Spitty; without them it's just another flying model.

When I embarked on this project I knew that a foam wing with almost no wood in it could be made strong enough to withstand aerobatics. I had pioneered the approach with a series of slope soarers, and had extended the concept to embrace a simple trainer type aileron wing for 'Can-Do' (Airborne No. 87). Those were much simpler shapes, and were all cut with a stainless steel (car battery heated) wire. Confronted with the complex Spitfire shape, it seemed obvious to simply sculpt it. This is a surprisingly quick process, but more surprising is its level of accuracy. You might think that achieving the same aerofoil on both panels is too hard. In reality this is quite easy because your fingertips are very much better guides-to-shape than you probably imagine.

Marking Up

I worked from block foam which just happened to be the right thickness. If that had not been available I would have cut the two panels from a larger sheet and would then have made a tapered block. After checking that the block is square, cut the dihedral angle at the root of each block, checking that they seat properly and form the intended angle. Then mark the leading edge and the trailing edge. Ensure that these two lines are parallel. If you wish to build in some wash-out then, obviously, that last note will not apply. In this case I decided to use the ailerons to achieve a wash-out effect by setting them 1 mm high.

The next marker, as shown in sketch 1, is a line representing the high point of the aerofoil. In this case it is not parallel to anything, but it is simple enough to plot as it follows the leading edge but it's 30% of the wing chord behind it. A similar line may be useful on the underside of each panel, but I didn't use one as the section employed is almost flat bottomed.

Hacking It Down

With a good coarse rasp, start thinning the tips and then work back to the root, thus forming the curved taper of the spanwise cross section (see sketch 2). In doing this you will remove part of the line which represents the maximum thickness of the wing, Re-draw that as necessary. Then start rasping down to the trailing edge line. Work across the full span of each panel and do not allow the rasp to go within 1 mm of the trailing edge line or within 5 mm of the maximum thickness line. Repeat this process on the leading edge side, then turn the panel over and very lightly shape the underside of the leading edge.

The underside of the trailing edge is best done with the sharp, coarse emery paper which will later be used to finish the whole surface.

Having done this, go back to the top trailing edge surface and let your fingers tell you where you have cut too deep. Then, using the emery cloth, gently work away at the high spots with SLOW strokes. That done, use the cloth to feather up to the maximum thickness line and down to the trailing edge line. Be careful about the latter because you want to retain a trailing edge thickness of about 1.5 mm in this case. The same concept is then applied to the leading edge and the undersurfaces.

The Dihedral Angle

In fitting the two panels together you need to be confident about the selected glue, and some experiments with scrap will prove to be very useful. In my experience contact type glues for foam are critically affected by the degree of cure allowed on the tacky surfaces before they are fitted. In my experiments the final bond has improved as the tack-set time was increased, but obviously there must be a point where it starts to get worse again. Finding the optimum is very desirable, and testing is the only sure way. I simply glue the two panels together, but I go gently because if it is not exactly right the first time there is almost no opportunity to remake the joint. Epoxy and PVA glues could be used.

With the two halves securely fitted it's time to insert the spar. I've used a couple of schemes, but for models with a span of less than 1.5 metres I've yet to improve on dowels in the diameter range of 4 to 6 mm. The channel into which these fit is easy to cut with a piece of hacksaw blade, but do not make the groove too wide. When these are solidly in position it's time to go gently over the entire surface with a slightly less gritty cloth. Fine grit papers do no good at all, and may even do damage by generating too much heat.

Before Covering

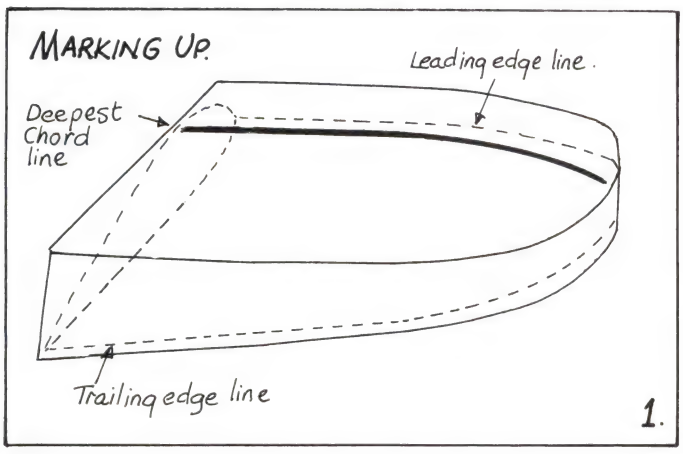
With the dihedral dowels set in position as shown in sketch 3, the wing is nearly ready for covering, but some thought needs to be given to the attachment of the wheels and a little re-inforcement at positions where chafing is likely to occur. In the case of the Spitfire, the legs were bent as shown in the sketch (see Airborne No. 93, page 23), and another piece of dowel was bound onto the straight section which turns inboard at the top of the legs. This was then glued down onto the lower dihedral dowel. The glue bond locates only the undercarriage and holds it against the sideways loads of landing.

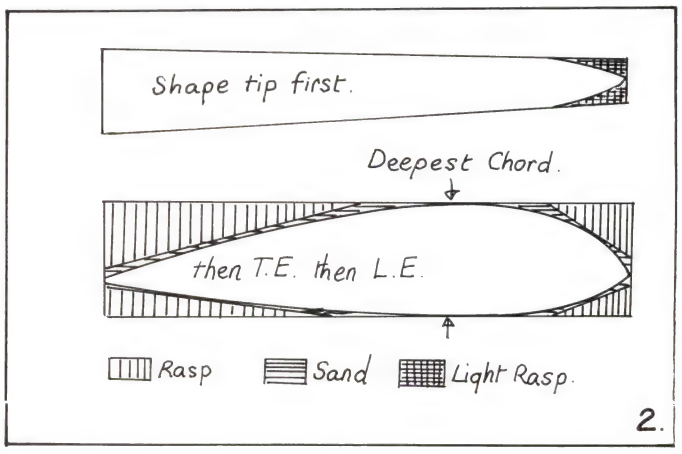
The wire frame which extends forward is bound at the front end, through the wing. Where the thread passes through the wing surface there are ply washers (on each side). The top one stops the foam from being compressed or torn in a heavy landing, and the bottom one stops the wire from chafing the foam during engine starts and taxi-ing. I know that it all sounds very flimsy, but it has been proven in several models of similar size.

The method of holding wings on with rubber bands is quite my favourite, as it has such a lot of crash insurance built in. However, the foam is quickly bruised by the bands, so a little precautionary re-inforcement is called for. In the



Quique Somenzini, Argentinian pattern champ, won the '89 Kraft Masters with this aircraft, which has removable wing tips that can be changed to suit the wind conditions. The short wing version was used in the fly-off, although there was no wind. Engine was a de-tuned YS 120 4-stroke.

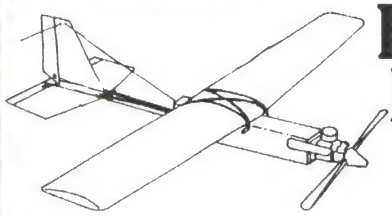




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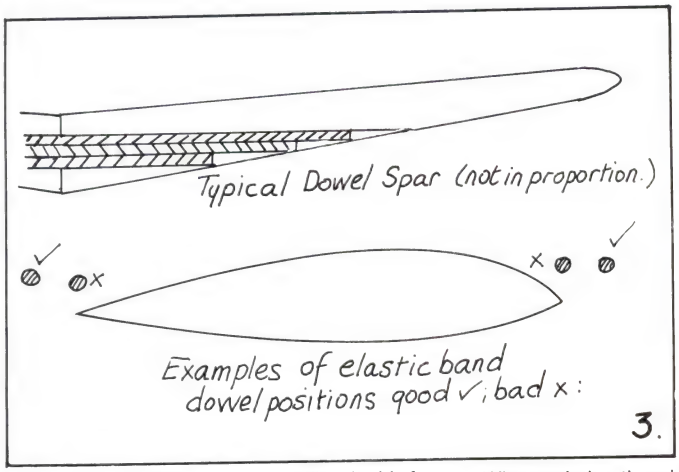
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A Curtiss P40E Kittyhawk by Nicholas Angove-Rogers of Sao-Paulo in Brazil. From a Brian Taylor plan. The model has home-made air-draulic twist retracts, and Super Tigre 61 ABC. Colours are those of the Brazilian Air Force.

case of the Spitfire the wing is fitted with four small folded scraps of aluminium (cool drink can). These are bent in the fingers to conform to the wing's edges, and glued in place. In all models the position of the dowel is worthy of more consideration than is usually given. You can reduce the bite of the bands by placement of the dowel without adversely affecting the fastening. Sketch 3 makes the point.

Control Linkages

In models of this size the drive to the ailerons is most easily achieved with torque rods. Here is a brilliant way to do it. Bend the rods to the appropriate shape, remembering to allow for the differential (more up, less down). Using a hack-saw blade, cut the path for the rod, and at three or four points along the path gouge out some little holes (see plan). Wipe the rods with buttery tissue (not excessively) then lay the rods in their channels and pour some (almost set) five minute epoxy into each little hole, over, under and around the rods. Let it go dead hard (one hour at least) and then gently twist the aileron end of each rod in the downward direction. This is a nerve-wracking moment, but after a little pressure the rod will suddenly come free with a distinct crack, and within a couple of swivels you will have a very free-moving, slop-free driver. Incidentally, I always use bike spokes for torque rods. They come in a range of lengths and guages.

Covering

I've been using brown paper for some years, and heartily recommend it. It shrinks well and provides a great base for paint. It is a little prone to fracture under stress in large model fuselages, but these tell-tale slits act as an alarm, alerting the modeller to excess landing loads and, if no other repair is required, are very easy to fix. I apply it damp, but not wet, and secure it with thinned Aquadhere mixed with wall-paper paste. It takes an hour or three to dry, but it adds a lot of strnegth with very little weight.

Hinges

It's probably a bit radical for the majority, but I also use brown paper as the hinge material for the aileron (and flaps). This technique has been applied to all classes and types of model, and has no equal in terms of efficiency, accuracy, ease and cost. The only caution is that you should use Aquadhere full strength to avoid the possibility of hinge peel at the hinge point.

When sticking the strip which joins and hinges the surfaces, on the upper surface keep the moving piece deflected fully down while the glue dries. The opposite applies if the hinge strip is on the lower surface (as it will be for the flaps). When painting the wing I take care not to put too much paint on this strip because it could inhibit the flex which, to date, has been excellent.

Tarting It Up

Until I started making foam models I had always used a quality oil-based enamel paint for my models, and, to be truthful, they always looked awful! With these techniques that type of paint is out of the question, and it was with considerable suspicion that I tried water solvent domestic quality gloss paint. I'm hooked. It's cheap, it's as fuel-proof as my old brew, and it doesn't make the house stink. It dries very quickly. It has a softer, more realistic sheen and, in the white form, it can be tinted to achieve a wide range of hues at very little cost. Strong colours, such as red, are better mixed by your local supplier, but artists' acrylic can be used to tint the more muted shades.

For me this has been a breakthrough, as I find the traditional process much too slow. My models are built for the flying field, not the showroom, but if you want to get a top finish you can with water-based gloss paints. It is just a question of surface preparation and coat thicknesses. Perhaps the biggest surprise is how easy it is to clean the surface at the end of the day's flying. I can't fault it.

The above technique of sculpting foam components can be used for large models too.

SO YOU'D LIKE TO FINISH YOUR RADIO CONTROLLED MODEL AIRCRAFT..... by Terry Plunkett

Herewith a further installation of Plunko's Peregrinations in the land of aeromodelling. This time we'll look at the art of finishing a model. We'll consider covering, paint and general things to the point where the model should be just about ready to fly.

However, before we launch into that, it's time for 'The Worm Turns' Department. You will recall the hiding I took in Issue No. 92 for daring to suggest the use and/or purchase of an electric starter for your engine. Well, I won't dispute that it might be kinder to hand start an engine, but I'm not Robinson Crusoe when it comes to enjoying the safety and convenience of an electric starter. Have a look at Mel's article in Airborne No. 79 on the Portatorque (Mel's portable Gates cell-powered starter) with pictures of his and Ian Avery's persuaders, and No. 80 in which, if my beady eyes don't deceive me, the Oily Engin-ear himself exhorts us to go forth and buy a Dave Brown cordless starter pack! I dips me lid and rests me case *Well, Brian: mechanicals as a last resort, I spose!*

Finishing

In all that follows, remember the KISS Principle. Those early models will need repairs from time to time, usually more often than you expect. Even



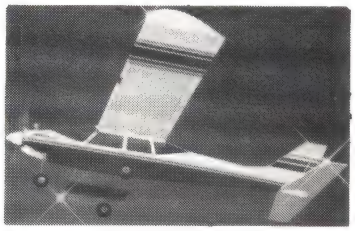
Some heavyweight equipment here: Norm Kirton's Big Lift on floats, about to be started for the Rottnest dash. What to do if you enjoy boats and planes! Photo from Jeremy Vaughan.

MIDWEST

PRECISION & QUALITY YOU CAN SEE & FEEL

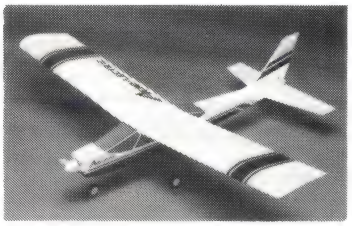
MIDWEST RC AEROPLANE KITS

AERO-STAR® .40 — KIT #159



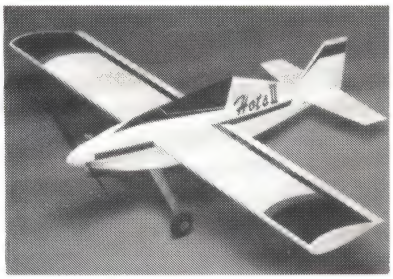
The finest R/C trainer available, featuring all of the most important qualties desired in a 'first' airplane; excellent self-recovery, three or four channel operation, light wing loading, and construction that is simple and strong. Wingspan 62 inch, Wing Area 675 sq. inch, Flying Weight 5 - 5½ lbs, Channels 3 or 4, 2-Cycle Engine .30-.40, 4-Cycle Engine .40-.45

AERO-LECTRIC™ — KIT #163



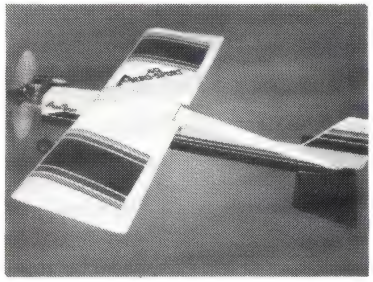
Aero-Lectric is designed for the entry level R/C modeller who wishes to pursue the newer field of electric-powered R/C airplanes. Designed with the same basic qualities as the Aero-Star, the Aero-Lectric is very stable and forgiving to the first-time flyer. Wingspan 50 inch, Wing Area 393 sq. inch, Channels 3, Electric Motor Midwest HP-100, Flying Weight 48-54 ozs.

HOTS II — KIT #164



The Hots II is a redesigned version of the Midwest Hots. Improvements include a larger fuselage, cowling, and a removable wing, allowing better access to your R/C equipment while still retaining the versatility of a wide power range. The Hots II will fly on anything from a .35-.45 engine. She's a docile sport plane with a .35, a competitive Fun-Flyer with a .40, and a missile with a .45. Wingspan 48 inch, Wing Area 468 sq. inch, Flying Weight 3-4 lbs, Channels 4, 2-Cycle Engine .35-.45, 4-Cycle Engine .40-.49.

AERO-SPORT® .40 — KIT #161



Midwest's Aero-Sports are first-class sport models. Designed specifically for the modeller who has successfully built and flown an Aero-Star, and is ready for an airplane with more aerobatic capability. Based on the classic lines of the Ugly Stik, the Aero-Sports have been designed to provide performance that you expect from a modern sport model, with the strength necessary to take hi-g aerobatics and rough landings. Wingspan 52¼ inch, Wing Area 594 sq. inch, Flying Weight 5½-6lbs., Channels 4, 2-Cycle Engine .30-.45. 4-Cycle Engine .45-.61.

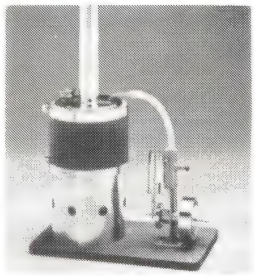
MIDWEST MODEL BOAT KITS

THE SEGUIN — KIT #957



The design of this model was taken from measurements of the real vessel, and blueprints and photographs made available by the Maine Maritime Museum at Bath. Length Overall 39 inch, Beam 7¾ inch, Height 23 inch, Scale 3/8"/1'

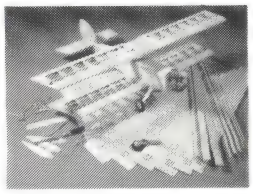
MODEL VI STEAM ENGINE KIT #980



Discover the thrill of live steam with this single cylinder, oscillating engine, and vertical boiler. Using methylated spirits or solid fuel pellets as fuel, the engine will run for approximately 10 to 15 minutes at a realistic 3-4 knot speed,

Ask your hobby retailer for details of other Midwest Steam or electric powered boats

BALSA AND THIN PLYWOOD



Only Midwest has all the sizes and shapes you need for those special requirements of R/C modelling. Balsa Triangles, Tapered trailing edges, shaped leading edges, aileron stock (pre-bevelled), maple motor mount, hardwood dowels.

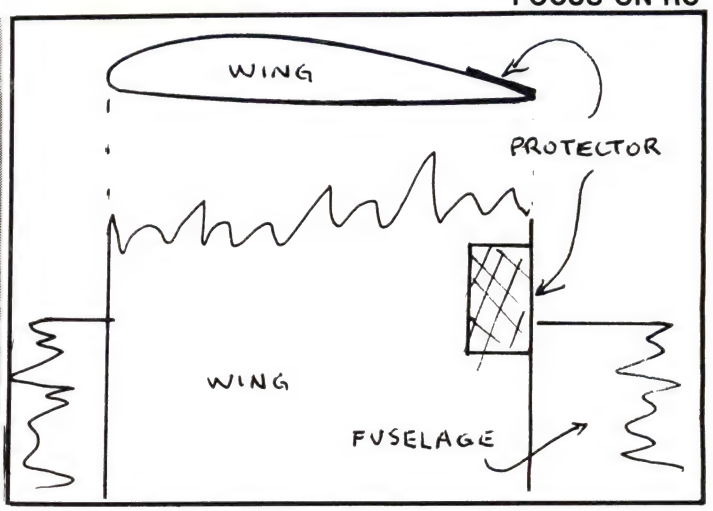
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A ¼ scale Aeronca Champion by Frank Hetterich, MAAQ President, at the Dalby power fly-in. Power is from an OS 90 FSR. Note those rego letters! Pic from Barry Harth.



if you're lucky, the laws of gravity can't be defied, and even the best of us have done our fair share of plummetting. So, if you're thinking of a multi-coloured scheme for your first model, try to keep it simple and bright so that repairs can be done quickly and easily. Use a finish that is tough and quick to patch.

Which way to go then, is the question. The old way was to use **tissue and dope,** or **silk and dope,** partly because the old models were open-framed devices and needed the holes filled in, and partly because there wasn't much else available. Those materials are still around and have their place, but their successful use is an art developed with much practice (see No. 77), and is not recommended for the beginner.

Fibreglass covering is great for adding strength. It also gives a fabulous finish which is hard to beat, however, if you're not good at it you can add excessive weight to the model and/or make a big mess of it because of the nature of the stuff. Obviously it's not a good way of covering open frames, but for fully sheeted models it gives a tough, smooth finish. It's the sort of job that you need some practical help with on your first go, and I'm no expert, so I'll leave the encyclopaedia of fibreglassing to someone else. (See Nos. 42 & 57.) There is polyester and epoxy to choose from, too.

Painting is a reasonable way to go if the model is fully sheeted. Any mug can paint! The drawbacks, however, are that surface preparation has to be perfect to get a good job, that a proper paint job (and repairs when needed) will require several coats of paint with curing time between coats, and that there is a real risk of adding substantial weight to the model if you overdo it. Yes folks! I kid you not. By the time you've filled all the dings and holes, primed and coated the beast, you could have added a lot of weight that you didn't want, so take it easy. *(First dope and tissue cover the woodwork to strengthen, seal and give a smooth surface.)* Again, I won't go into the details of painting. Obviously the instructions on the can are required reading, and if you can get hold of a spray can or spraygun that's even better than brushing. Polyurethane paints are tougher than some of the plastic paints and oil-based potions. Make sure that whatever you use is fuel-proof; most are, but the water-based ones are not.

Film Covering. Possibly the easiest finishes are the **iron-on films.** These are all heat-shrinking plastics of various types, with a heat-activated adhesive system. They stick to the airframe when heated, and shrink to a tight, smooth finish. You all read Mr. Fix-It's article on the application of these films in No. 90, didn't you?

I like the iron-on films for trainers because they give a good finish without the need for fiddly surface preparation, they are quick to apply, they are not messy (very important to your survival if working on the Ayatollah's dining room table), and they can be used immediately after being applied. You can prang an aircraft one day, do an overnight repair, including patching the covering, and be back in thr air the following morning with a model that looks as good as new.

Let's spend a little time looking at the iron-on films. For starters, there are a number of films on the market. I will stick to my usual practice of not recommending any particular brand. Most have comprehensive instructions that are both foolproof and simple. If they don't, don't buy them. As with most things, quality of films is generally proportional to price. Read the instructions carefully and have a browse through Mr. Fix-It's article and you should get a good result. The iron and the heat gun are specialised tools; you'll need to beg, buy, borrow or steal these, but don't try to do it with the Ayatollah's domestic iron! The family iron won't work very well (too heavy and no control), and nor will your ears when she finishes telling you about the misuse of household appliances. Now, here are some tips which Mr. Fix-It didn't tell you:

Tips for Iron-On Films

When ironing one layer of film over another you will often get air trapped between the layers, forming bubbles. Try to work them together into one or more big bubble using the heating iron. Poke a pin into the side of the bubble (try not to puncture both layers of film) and work the air out of the hole by starting at the side of the bubble away from the hole and ironing towards the hole.

Wing warps can occur when covering lightly constructed frames. The cure is to gently twist the frame to where it ought to be and see where the film wrinkles. At that point is an area of low tension. Let the thing go again and gently apply heat where the wrinkles appeared. Watch as the twist begins to disappear. Keep twisting, finding wrinkles and heating until the warp is cured. It takes patience and experimentation, but is very effective.

Tears and holes are easily mended. If the film is opaque, just cut the original covering to a round-cornered hole, with no sharp cuts or tears to help propagate another tear, then iron on a matching patch with at least 10 mm overlap on all sides of the hole. For translucent finishes it's harder to get a good appearance to a patch (probably a good reason for not using them on a trainer). You can try hiding the overlap by locating it over a rib or solid section. Alternatively, you can use a different colour and apply mirror image patches to both sides of the aircraft, shaped to look like a deliberate pattern.

Fuel-proofing is important for iron-on film too. Some time back I recommended epoxy or polyurethane coating of the engine bay and nose bits. After covering I like to go back to the nose area and put a thin coat of epoxy or polyurethane over the edges of the iron-on film to seal it to the underlying epoxy or polyurethane. That stops fuel from creeping under the edge of the film and lifting the film. Most films are fuelproof on the outside, but don't retain adhesion if the fuel sneaks in under the edges.

Surface preparation doesn't have to be perfect. Sand off any bits standing proud of the required finished surface, but don't worry about filling hollows, cracks or small dings. The film, when ironed on, shrinks to a drum-tight finish and covers cracks and hollows without trace, eliminating the need to fill these holes and thereby adding weight.

For wings held on by rubber bands, trailing edges will get badly chewed by the rubber bands because they're thin. To protect the film and underlying balsa, epoxy a small perspex or aluminium square (from a beer can) to the upper trailing edge where the rubber bands pass over it (see diagram).

Of all the finishes, the iron-on film is the easiest to use, gives a good finish for minimal effort, is robust yet light, and is fastest to apply and repair. If all else fails, follow Plunko's Rule No. 1 - get some help at your local club.

Well, that's it from me this time. Next time: final adjustments and some tips on that crucial first flight. Now it's time to slip off to the local meeting at the Pessimists' Club, if it hasn't been cancelled or the clubroom hasn't burnt down.

ANOTHER TRY

The following page about the Elfin 1.49 being made at Doonside has been placed in the previous 5 issues of the magazine! It has been removed every time to make way for late advertisements. Hopefully it will not suffer the same fate this time! It is well worth another try.....

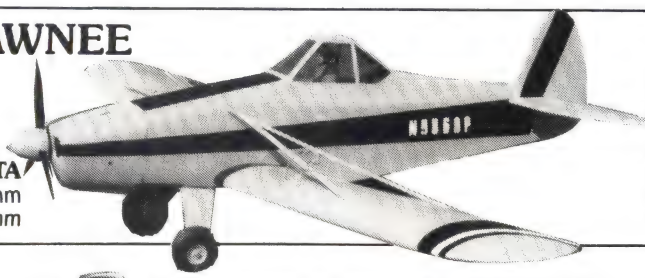
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THE NEXT GENERATION MODELS

Our wings are created out of fibreglass and epoxy resin, offering extra strength and durability. Building becomes a breeze.

PIPER PAWNEE

$435.00

TECHNICAL DATA
WINGSPAN: 2290mm
LENGTH: 1420mm



This very successful model has excellent flying characteristics and it looks great.
KIT CONTAINS: Fibreglass fuselage, foam core wings, fibreglass wingtip, balsa wood for rudder and tailplane (full size in plan), balsa wood planking material for wings, clear plastic sheet for windows, wingframes four pieces, complete front and back undercarriages with springs, wheels large four inch inflatable, tank 14oz, hinges and wingbolts, plan.

TRANSALL C 160D

FRENCH-GERMAN ARMY TRANSPORTER

TECHNICAL DATA
WINGSPAN: 2100mm
LENGTH: 1620mm
WEIGHT: 3000g

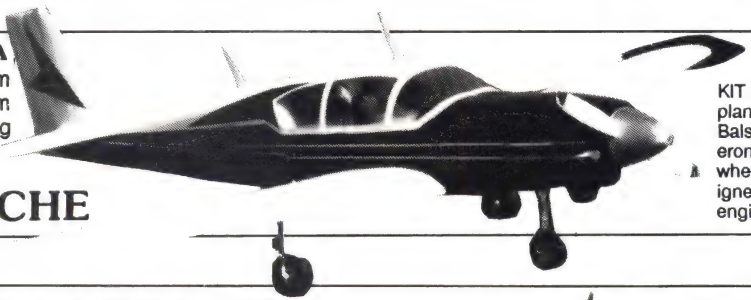


PRICE: $535.00
with foam wings $395.00

KIT CONTAINS: fibreglass fuselage, fibreglass wings with moulded engine cowlings with panel markings and rivets. Balsa wood material for flaps, rudder, ailerons and elevator. 10 wheels, 2 fuel tanks, 2 spinners, decorsheet, fittings and plan. Designed for 2,40 2 stroke or 2,60 4 stroke engine.

PIPER COMMANCHE

TECHNICAL DATA
WINGSPAN: 1920mm
LENGTH: 1640mm
WEIGHT: 2300g

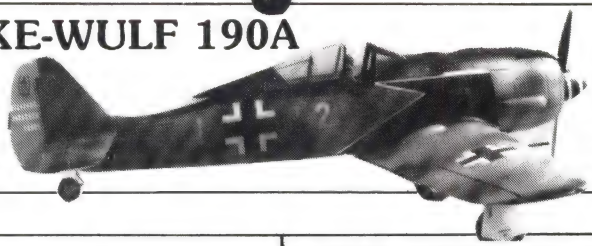


PRICE: $465.00

KIT CONTAINS: fuselage, wings and tailplane made completely out of fibreglass. Balsa wood material for flaps, rudder, ailerons and elevator. Clear plastic canopy, wheels, fuel tank, fittings and plan. Designed for 2 stroke engine 10-15cc, 4 stroke engine 15-20cc.

Scale FOCKE-WULF 190A

TECHNICAL DATA:
WINGSPAN: 1900mm
LENGTH: 1620mm
WEIGHT: 3000g



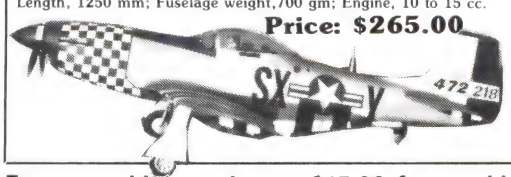
Price: (large) $695.00

KIT CONTAINS: fuselage, wings, tailplane, flaps, rudder, elevator, ailerons made completely out of fibreglass. Model 90% ready out of the Kit. Detailed panel markings and rivets on all surfaces. Clear plastic canopy, fuel tank, decals, fittings and plan. Designed for 2 stroke engine 20-35cc. (Scale Retracts Available).

SKYRAIDER has **3** other models available:

FOCKE-WULF; a smaller version, which flies like a trainer and looks great; TECHNICAL DATA: Wingspan, 1700 mm; Length, 1250 mm; Fuselage weight,700 gm; Engine, 10 to 15 cc.

Price: $265.00



NORTH AMERICAN MUSTANG P51D; TECHNICAL DATA: Wingspan, 1660 mm; Length, 1300 mm; Fuselage weight, 800 gm; Engine 10 to 15 cc. These two models have fibreglass fuselages with markings and rivets. Wings and tailplane from foam and balsa wood. Wheels, fuel tank, Clear plastic canopy, decals, fittings and plans included.

Price: $265.00

NEW SPINNERS AVAILABLE

Large FW-190A
Small FW-190
Mustang P-51D

P-82 TWIN MUSTANG

TECHNICAL DATA
Wingspan 2160mm
Length 1300mm

PRICE $435.00



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AN EPISODE OF THE *ELFIN* STORY

from Ivor F.

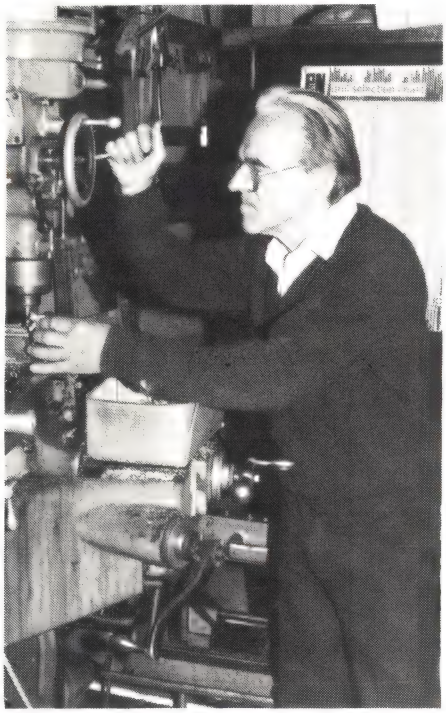


Discussion about how close the replica should be to the original. Considering the Australian Elfin 1.49 project are: John Corby, designer of the Starlet and chief engineer for Transavia; Barry Lee, Editor and co-producer of Free Flight Down Under for over ten years; Ivor F, producer and choreographer of the Doonside Mills and Sesqui projects; Frank Faber, Principla of Blacktown Boys' High School and the master of the capstan lathe and cylinder grinder.



Photographs were taken at the Doonside workshop by Bob Williams, who was featured on the cover of AIRBORNE No. 12, May 1974, with his Transavia Airtruck.

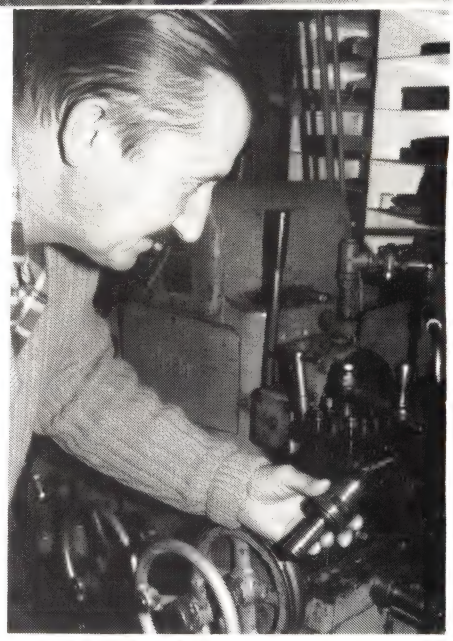
Boyd Felstead attends as Gordon Burford makes a point about workshop practice. Life-long friends, both are world-renowned experts in their own fields; Boyd as an indoor modeller and correspondent, and Gordon as a model engine designer and manufacturer. Both are illustrious members of the MAAA Hall of Fame.



Ivor F takes another Elfin crankcase out of the mill where the mounting lugs have been machined to a common plane. The next stage is six operations on the light capstan lathe. A big machine to make such a small object! The Elfin project is also big, but production run is limited, and sure to sell out.



Andy Kerr checks a tool on the Herbert 20 lathe on which the Elfin cylinders will be made. Andy is a professional engineer, and has been designing and making special model aircraft engines for many years. With such talent supervising the Elfin project, its quality and performance are assured.



Frank Faber setting up a centre drill for cylinder liners for the Elfin 149. Frank made the replacement hard shafts and cylinders, pistons and contra pistons for the Sesqui. Such experience is typical of the members of the Elfin team. Although now probably ineligible for Old Timer competition, due to a change in the cut-off date by SAM, the Elfin will be a valuable engine for free flight, control line and radio control sport flying in its own right. Enquiries may be sent to P.O. Box 11, Doonside, NSW, 2767.

MR TOYS

MIJET 72 aerobatic slope soarer
72" span, 2-3 channel.....**$125.00**

TELEMASTER 66 quick build trainer
19-40 engine, 3-4 channel.....**$89.00**

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63" span, 2 channel.....**$35.00**

BI-FLY 25 sport biplane
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BI-FLY 40 sport biplane
48" span, 40-60 engine, 4 channel.....**$130.00**

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7 Channel, 4 Servo, FM, Dry Cell, only.....**$280.00**

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Very Handy — **$9.99**

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5 Ch. Radio, 4 Servo
Nicads & Charger
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Scratch built Hawker Tomtit by Mike Crisp of Thornleigh, NSW. Span is 1740 mm, length 1460 mm, weight 5 kg, and power is from an OS 90 FS. Sanwa radio provides control. Mike regards himself as an average club modeller. The average is pretty high around Thornleigh!



One of Chris Foss' designs, the Acro Wot, built and flown by Tom Cole of Adelaide. A hot performer with an OS 60 FSR. Photo by Don Howie. Lucky pilot has a tinted canopy!

SINGLE AILERON PYLON RACERS

By R. Sutherland; from Windsock, June 1989

In the May issue Peter Hardy-Atkins suggested that a single aileron pylon racer should have the aileron fitted to the 'low' wing only. This is incorrect. The aileron should be fitted to the 'high' wing (right wing for a typical anti-clockwise circuit). In this way any aileron induced drag will tend to keep the model's nose up during the turns. Due to the sections used and speeds flown, performance in both left and right turns will also be quite similar with a single aileron pylon racer.

MULTI CHARGE-A-MATIC — This One Will Charge Them All!

It looks as though Hi-Tic has done it again. This South Korean company is becoming more adventurous, even innovative, with age. Despite the plethora of electronic gizmos in our sport, their Multi Charge-A-Matic should fill a consumer niche for modellers looking for total nicad care in one economical package. This one will just about do it all. A field (12 volt source) charger to handle anything from 1.2 to over 12 volts (one to ten plus cells), and all capacities from the small 50 mAh to the big 4000 mAh cells.

Specifications:

Automatic voltage peak detection charger;
Constant current pulsed charging;
Will charge packs of up to at least 12 Volts;
Constant current, selectable in steps - 0.9, 1.6, 2.6, 3.4, 4.0 and 4.5 Amps maximum;
Auto trickle charge on termination;
Auto discharging in steps for all popular capacities from 270 mA to 1,800 mA cells, and from 4.8 V (4 cells) to 10.8 V (9 cells);
Audible warning device (buzzer);
DC to DC booster circuit enables charging of batteries over 12 V;
Safety timer cut-off if charge exceeds 50 minutes;
Reverse polarity protection by fuse;
Large heat sink base.

The Right Connections

'What does all that technical stuff mean?' you may ask. Quite simply, it means that you can set and forget. The voltage of a nicad under charge gradually rises to a peak and then quickly falls when full. This device detects the voltage peak and terminates the charge, automatically. The constant current circuitry means that the charging current will not taper off towards the end of a charge, thus giving the quickest and most effective charge.

In use you first have to set the various plugs and switchws to suit the battery under charge or discharge. For example, a typical receiver pack will be set for charging at under 8.4 volts via a switch, and the current set to 0.9 Amps, which will charge a typical 500 mAh pack in about half an hour from dead flat. You could charge at a higher rate if in a desperate hurry, but the life of the cells may be compromised. Connect the input to a 12 V auto battery. Connect output to either charge or discharge terminals. Instead of permanently connected output leads, this unit has built-in, spring-loaded terminal posts to which the correct lead and plug must be connected. Loose Tamiya type plugs and wire are supplied for the buggy and electric flight folk. Actually, it is easier to set up than to describe, and you have to do this only once for each pack.

Charging

Hold the start button down for at least five seconds. This starts the charge and also the red light (LED), which flashes at a rapid rate. When peak voltage, and hence peak capacity of the battery, is reached, the fast charge will automatically terminate and change to a trickle charge, the buzzer will sound and the light will blink slowly.

Discharge

The otherwise excellent instruction booklet calls this process 'Efficiency Testing'. No problem once you sort out the terminology. In fact, their name is probably more correct, since this unit discharges cell(s) and then displays their efficiency as a percentage. After making the adjustment to suit the battery undergoing discharge, the start button is pressed and the other little red light will then blink slowly. On completion of discharge the buzzer will sound and one of the six green LEDs will show the percentage efficiency of the battery or cell. Note that this gives only an approximation of battery capacity to the nearest 10%. However, the process is fine for re-cycling of nicads and for checking if they are still up to scratch.

Summary

Another well designed, well made, good-looking and good value product from Hi-Tec. I have been using one for several weeks now and have found no problems. It is easily adapted to many uses associated with the care and feeding of nicads, and is especially suitable for electric flight use for quick charging of up to ten cells at once. About the only desirable thing that it will not do is give a quick field check of nicad condition; otherwise the Charge-A-Matic could just about replace every other charger-discharger on the market.

The Editor has one also! Available from your local hobby shop. Imported and distributed by Model Engines Aust.

AGAINST THE TIDE

by Peter Hardy-Atkins

While the trend in recent years has been towards larger models, there are still plenty of modellers working towards ever smaller air-forces. The miniaturisation of radios appears to have stopped, but the dream lives on. Peter Hardy-Atkins is one of the dreamers!

Shrinking

As radio has become more and more reliable it has become quite reasonable to allow modellers to fly massive models within striking distance of urban populations. The early radio control models were large because they had to be to lift all those batteries. With the transistor revolution in the early sixties radios became tiny and much more reliable. Since then the size of receivers has hardly changed. Servos have become much smaller for specialist use in gliders, but the other components have hardly changed. For those with a desire to fly model aircraft in the lounge-room, the potential of space-age technology has remained untapped.

Batteries

Flight packs weighing less than three ounces (80 grammes) are still few and far between, but most modellers can approach these lower limits with fairly small investments. The heaviest component in the average flight pack is the rechargeable battery, which averages about 110 grammes (3.9 oz). Provided that you don't need a lot of duration, this can be reduced to 18 grammes (0.65 oz). That dramatic reduction makes it possible for a very conventional two channel receiver with one micro servo and the battery to weigh less than 60 grammes (2.17 oz).

The batteries which make this possible are the rechargeable cells which have been developed to protect the memory circuits of programmable devices such as video recorders. Mind you, they are not cheap at $6 per 50 mAh cell. With non-rechargeable batteries the same sort of weight is achievable with improved duration. The latest breed of polaroid cameras employ a disposable 6 volt battery in each pack of film. If you can find a regular user you're on to a ready supply of useful, lightweight batteries. If you go to buy them as polaroid accessories you'll pay $10 a time.

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How Phillips Made His Entry

by Martin Simons

George Cayley, who was flying model aircraft successfully 180 years ago, was probably the first person to test a wing profile under artificial conditions before trying it on an aircraft. He constructed a whirling arm, driven by weights and strings over pulleys, so that the model wing swept round and round in a large circle at some speed. By varying the load on the arm and the angle of attack of the test wing, estimates could be made of the liftingt power of the surface.

The first wind tunnel was built by another Englishman, Francis Herbert Wenham, in 1871. Wenham appreciated that when measuring aerodynamic forces, the same results would be obtained more easily if the air was blown or drawn over a fixed test piece instead of moving the wing through still air.

Enter Mr. Phillips

Horatio Phillips was a well known engineer at this time. After a great many experiments with various types of flat and curved plates in a steam driven wind tunnel that he designed, he took out, in 1884, a patent for the first true aerofoil sections. Phillips discovered that thin plates curved, or cambered, to a strictly circular arc did not give the best results. Previous experimenters had literally been following the wrong line in this respect. He discovered that the curvature was best biased towards the leading edge of the wing, the high point of the section's centre line being at about one third of the chord. Rather than making the aerofoils as thin as possible, it was wise to fair the curved plates to encourage a streamlined airflow.

Phillips designed a number of profiles in which the basic camber line was enclosed by a streamlined form. The resulting patented profiles are shown in Figure 1. These became widely known and were of considerable use to the Wright Brothers when they began their own wind tunnel experiments.

Phillips later patented the aerofoil section shown in Figure 2. On this profile the underside near the leading edge was bulged out slightly. This bulging of the lower surface of the wing near the leading edge became known as the **Phillips Entry.** It was intended to reduce drag by avoiding the sharp change of direction of the airflow on the underside of the leading edge, without greatly affecting the overall camber of the profile. The underside bulge also gave a little more space inside the wing for structural members such as spars.

Phillips himself went on to produce a multiplane model with a tricycle undercarriage and a steam engine driving a 2 metre diameter propeller. About 40 thin, high aspect ratio wings of Phillips' section were fixed one above the other on a rectangular frame. The span was 5.8 metres and each wing had a chord of only 38 mm, so the lifting system looked rather like a Venetian blind in the open position. The model was tethered and driven round a circular track at Harrow in May 1893. The multiple aerofoils succeeded in lifting it off the ground at a take-off speed of about 64 kph. A few years later a larger machine of the same type was built, and this too, although weighing 175 kg, got off the ground, still tethered.

Phillips gave up aeronautics after this, until news of the Wright Brothers' success reached him. He built a man-carrying flying machine with four sets of his Venetian blind lifting units, and succeeded in making a small hop in free flight with a petrol engine driving the propeller. By the time Phillips died in 1926, aged 81, his famous experiments had long been surpassed and the Phillips Entry was forgotten by all except historians and, strangely, some aeromodellers.

It would be interesting to know how this perpetuation of the old term came about. The present author, as a child, first came across it in a little book called The Model Aeroplane Manual written by Lawrence H. Sparey and Charled A. Rippon, first published in the 1930s by Percival Marshall & Co. Both the authors were very well known in the aeromodelling fraternity, Sparey testing and writing about model engines for Aeromodeller, and Rippon, the Rip of Ripmax, running model shops and, after World War 2, establishing himself at Parkway, Camden Town, where the shop still operates. My own copy of the book is the third edition, which appeared during the war. Figure 3 here shows how the term Phillips Entry was interpreted at this period. The only relevant text reads:

"Figure 27 (in the book) shows a wing section illustrating the meanings of two terms often used when speaking of aerofoils. 'Phillips Entry' describes the particular type of leading edge shown in the drawing, while the turned up trailing edge is known as a 'Reflex Edge', the advantage of which is that it limits the travel of the centre of pressure caused by an alteration in the flying angle. It is, therefore, helpful in preventing the wing from stalling.

In rubber driven model work it may generally be considered that a thin, low lift section is preferable to the high lift type, and that a Phillips Entry and Reflex Trailing Edge may often usefully be incorporated."

It is doubtful if Horatio Phillips himself would have recognised his Entry in this diagram. Rather than bulging out the underside, the basic idea seems to have been to bend the leading edge upwards in the same was as the reflex trailing edge reverses the camber at the rear. The result is to produce a profile with a distorted or humped camber line. The connection with Phillips' original entry is that, in both cases, the effect is to reduce the effective camber near the leading edge.

It is now well understood that the general shape of the camber or skeleton line of an aerofoil section is of great importance to the behaviour of the wing. The camber near the leading edge has particularly great influence on stalling characteristics, and merely tweaking the leading edge of a profile upwards is a bad procedure. What Rippon and Sparey did not point out was that a profile for high speed flight could be obtained more easily by using a section designed from the start with less camber. There were, and are, plenty of these available.

When, in the late 1920s, aerofoil design methods became more systematic, the NACA in America adopted standard equations for setting out camber lines. The famous four-digit profiles, NACA 4412, 2410, 6409 and so on were based on this formula. In this series of wing sections the first figure always gives the value of the maximum camber as a percentage of the chord, and the second digit gives the position of the highest point of the camber line in tenths of the chord. The last two figures give the thickness in per cent. Thus the 2410 section has 2 per cent camber at 4 tenths chord and is 10 per cent thick The 0009 is a symmetrical profile, 9 per cent thick; and so on.

With these developments, the ancient term Phillips Entry became superfluous, and it is now virtually meaningless since it is applied almost indiscriminately by modellers, even to aerofoils like the famous (and still excellent) profile, Clark Y. I recently showed a few hundred wing profiles to a friend who uses this term, and asked him to show me one which has a Phillips Entry. He had to say in the end that either they all do or none do. This being his answer, it seems that the term is useless to us now.

The Phillips Entry has sometimes been credited to William Hewitt Phillips, a very active and well known model flyer in Hampton, Virginia, and formerly a research engineer with NASA at the Langley wind tunnels. I wrote to Hewitt asking if he knew what people were saying, and if he really was responsible. I quote part of his reply:

"Though I am old enough that most of my possessions are considered antiques, I still attempt to maintain the impression that I am not one myself. Therefore I must correct the view that I am responsible for Phillips Entry. This feature was the invention of Horatio Phillips, and Englishman, who patented it."

The date of the patent was 1891. It seems to be time for Phillips Entry to make its final exit. Anyone who uses the term today is a century behind the times.

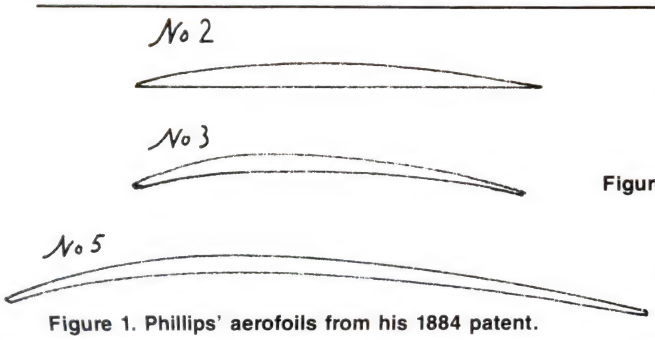


Figure 1. Phillips' aerofoils from his 1884 patent.

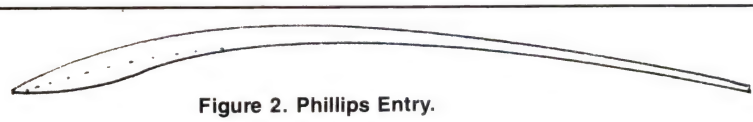
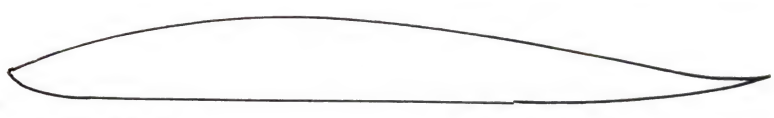


Figure 2. Phillips Entry.

Figure 3. Extract from The Model Aeroplane Manual by Sparey & Rippon (1938?).



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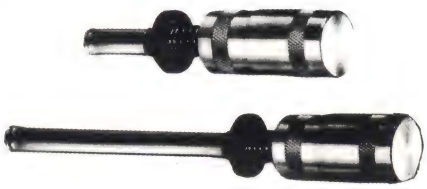
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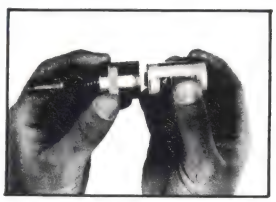
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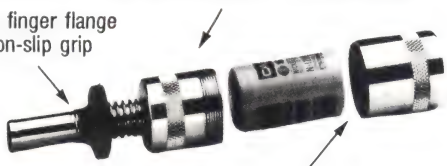
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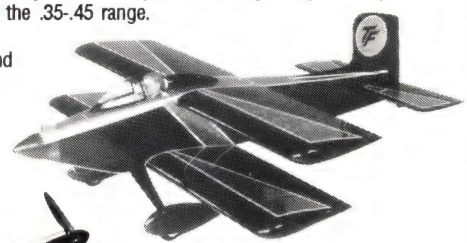
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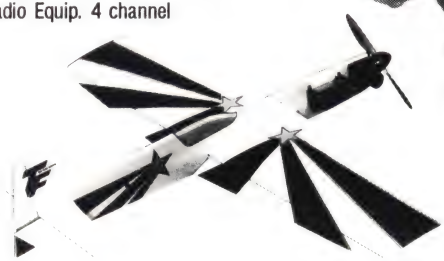
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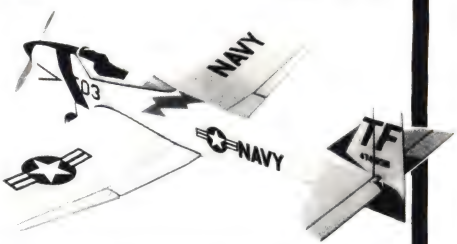
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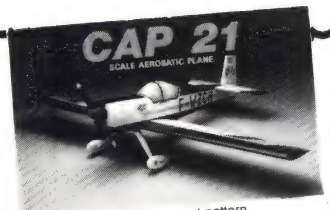
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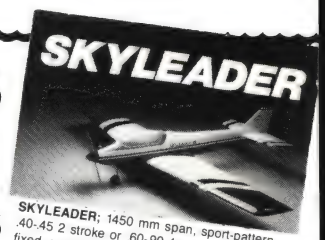
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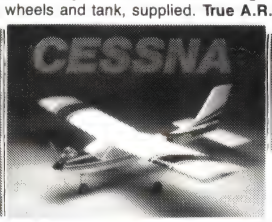
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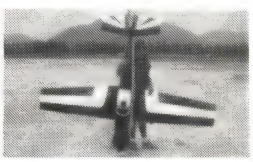
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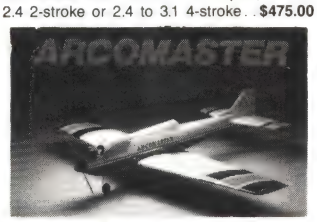
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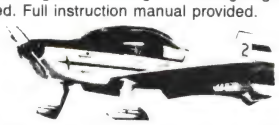


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40 CDI s/start & mt. & muff..... **$349.00**

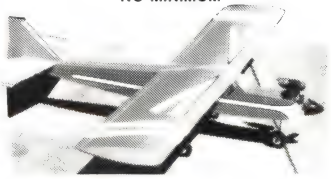
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20 RC Sportster..... **$92.50**
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HHQ AAA GRADE MICRO CUT, Sizes Approx

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0.8 mm	$0.67	$0.92	$1.50
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2.5 mm	$0.82	$1.13	$1.88
3.0 mm	$0.98	$1.32	$1.99
5.0 mm	$1.27	$1.72	$2.53
6.5 mm	$1.42	$1.87	$2.85
8.0 mm	$1.57	$2.52	$3.40
9.5 mm	$1.98	$2.87	$4.57
12.5 mm	$2.42	$3.27	$5.75
19.0 mm	$3.22	$4.32	$8.45
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NO MINIMUM



BEGINNERS' SPECIAL
Hi-Tec Challenger 4 Ch. 36 MHz with Reversing, Nicads, Charger, 4 Servos + K&B 40 RC Ballraced Engine & Pricerite Western Trainer 40 kit.
$499.00
QUALITY EQUIPMENT FOR THE BEGINNER

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Top Quality SAFT Nicads

500 mAh AA Cells **$3.70**
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Sanyo 600 mAh AA Cells; tagged . . . **$4.90**
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Quiet Advancer **$64.95**
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Buzzard Bombshell **$89.95**



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Playboy Senior **$89.95**
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Simplex **$72.50**
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Hand Selected Precision Kits —

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75% Dallaire	**$114.95**
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Senorita; Top trainer,
for .20 to .35, 1600 mm span . . . **$105.00**
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Kobra; 1143 mm span **$109.00**
Smith Miniplane; 1120 mm span . . . **$189.00**
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Astro Hog; 1800 mm span **$209.00**
Clipped Wing Cub; ¼ scale, 2185mm . **$379.00**



¼ SCALE J3 CUB

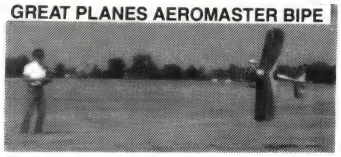
J3 Cub; ¼ scale, 2670 mm **$395.00**
Riser 100; 2540 mm sailplane **$130.00**
Citabria; 1752 mm span **$225.00**



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Airtronics Sagitta 900;
Hi-perf sailplane, 99 inch span **$219.00**

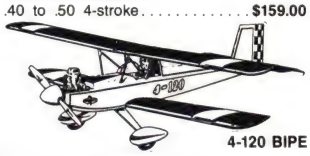
GREAT PLANES AEROMASTER BIPE



Great Planes Aeromaster Bipe;
for .65 to 1.20 4-stroke **$259.00**

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Ace-4-20; 1232 mm span,
.15 to .20 2-stroke or .20 4-stroke . **$109.00**
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.40 to .50 4-stroke **$159.00**



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Ace 4-120 Bipe; 1778 mm span,
for .90 to 1.08 2-stroke
or 1.20 4-stroke **$359.00**
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CAP'N EDDY PILOT



Senior Telemaster; 95 inch span
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2667 mm span **$259.00**



Combat Models F16 Slope Soarer;
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Wing & Fuse Jig Complete
Must-Have item **$169.00**



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add $21.95 for extra servo
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FAIRCHILD PT19 & SAITO FA-120S

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Extends to 1830 mm (6 ft) **$12.50**

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3-10 decibels quieter than stock muffler, no
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COSMO BEST VALUE ON THE MARKET

COSMO 10SR



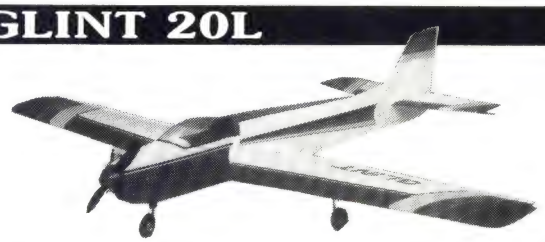
Cosmo 10 SR is a model for .09-.15 size engine and can be flown with 3 or 4 channels. (It can be flown on 4 channels when you want aerobatic flying). This kit is for those who want an easily assembled model with excellent flying characteristics. Length 33 in, Wing Span 41 in, Wing Area 310 sq in, Engine 09-15, R/C System 3-4 channel.

DANDY 20



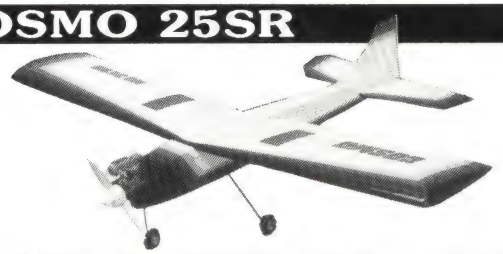
Cosmo Dandy 20 is a shoulder wing model that has excellent stability and aerobatic performance. Dandy 20, using a 20-30 size engine, is a most suitable model for beginners who want to learn aerobatics. It can be flown with 4 channels, and is a high-class aerobatics training model that has an elegant appearance. Length 45.3 in, Wing Span 52.4 in, Wing Area 474.3 sq in, Engine 20-30, R/C System 3-4 channel.

GLINT 20L



Cosmo Glint 20L R/C airplane is designed for the beginner who wants to enjoy easy aerobatic flying at high, as well as low speed. A stable aircraft for the transition from trainer to aerobatic. Length 11800mm, Wing Span 1334mm, Wing Area 31.02dm sq, Engine 19-25, R/C System 3-4 channel.

COSMO 25SR



Cosmo 25SR is a model using .19-.25 size engine. It is fully aerobatic, using ailerons if you want. Cosmo 25 SR kit contains high quality steerable nose gear, hinges, control horns and aluminium engine mount. Length 38 in, Wing Span 50 in, Wing Area 450 sq in, Engine 19-25, R/C System 3-4 channel.

HURRICANE 40S



Hurricane 40 S is a shoulder wing model using 40-45 size engine and 3 or 4 channel radio (but is best with 4). It contains high quality steerable nose gear, durable pre-bent landing gear, hinges, control horns, nylon engine mount and spinner. Full size plan and an illustrated construction guide all make this an easy model to build. Length 46 in, Wing Span 61 in, Wing Area 666 sq in, Engine 40-45, R/C System 3-4 channel.

COSMO KING 40SR



King 40SR is a high winger that contains high quality balsa and plywood parts. Durable landing gear and excellent flying characteristics of this aircraft are ideal for the beginner or novice flyer. Length 45 in, Wing Span 61 in, Wing Area 666 sq in, Engine 40-45, R/C System 3-4 channel.

HURRICANE 40L



Hurricane 40 L is a low wing model using 40-45 size engine. Kit comes complete with high quality balsa & beautiful die-cut balsa ribs. Great for both the new and advanced modeller who wants aerobatic flying. It contains vacuum formed canopy, hinges, control horns, hard wood engine mount, spinner, full size plan & illustrated construction guide. Length 44 in, Wing Span 61 in, Wing Area 666 sq in, Engine 40-45, R/C System 4 ch.

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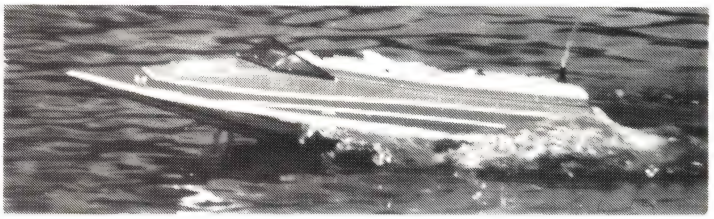
Please tell Advertisers that you saw it in AIRBORNE.



Tony and Mike Farnan in front of the Model Engines display at the 1989 Toy & Hobby Fair, with Ralph Walsh, designer and pilot of the radio controlled balloon floating over his head. Having fun on the job! Photo via the manager.



Peter Bons with the Scale Airtourer by Scale Aviation. Kit features GRP fuselage, aluminium wing and tail spars, pressed al skins on control surfaces, machined al wheel hubs, telescoping nose gear, sliding canopy. Span is 2.46 metres, length 2.08 metres, and weight 13.6 kg. For 5 channel radio and engines over 40 cc. Enquiries to Scale Aviation, 101 Angle Road South, Leumeah, NSW, 2560; phone (046) 25 8162.



New electric boat kit from Southern Model Supplies: the Academy Sea Dart. Length 570 mm, Beam 240 mm. RS540S with 3:1 reduction drive, speed controller, comprehensive instruction book supplied with the kit. Built-in floatation prevents sinking; water resistant radio and motor compartment. With hot-wind motor and 7-cell battery it can outperform some larger and more expensive boats. Southern Model Supplies are at Box 112 Daw Park SA 5041; phone (08) 276 7722.

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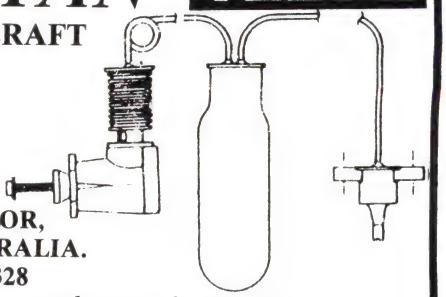
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21 x 12	12½ x 11½ 3B	11 x 10¼ 4B
20 x 10	16 x 6	12 x 10 3B
20 x 8	15+ x 8	12 x 11½
18 x 12	15 x 7	12 x 10¾
18+ x 8	14½ x 12	11¾ x 10¼
18 x 10	13½ x 12	12 x 9¾
16 x 10	13¾ x 10	12¼ x 9¼

SPORT 60/40	PYLON
11 x 7 4B	8 x 7N
9½ x 6½ 4B	8 x 6½
11 x 7½ 3B	8 x 6½N
10+ x 6¼ 3B	8 x 6
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10½ x 8	6 x 5
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60 Size Retracts with Chromoly Leg and Functional Scissors. Lower Strut is made from High Grade Alloy.

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60 inch, 40 Size Trainer. Glass fuselage.
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81 inch span; weight 9 lb.
For .40 size motor.
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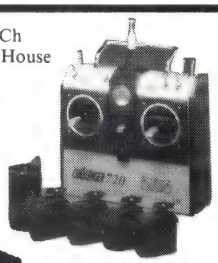
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RRP: ~~$235.00~~ ***Crazy Price:*** **$169.90**





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TELEMASTER COUPE 66; low wing trainer, 25-40 engine. jig spar wing, 4 channel, best low wing trainer; ~~$99.00~~ **SALE** **$79.90**

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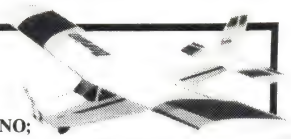
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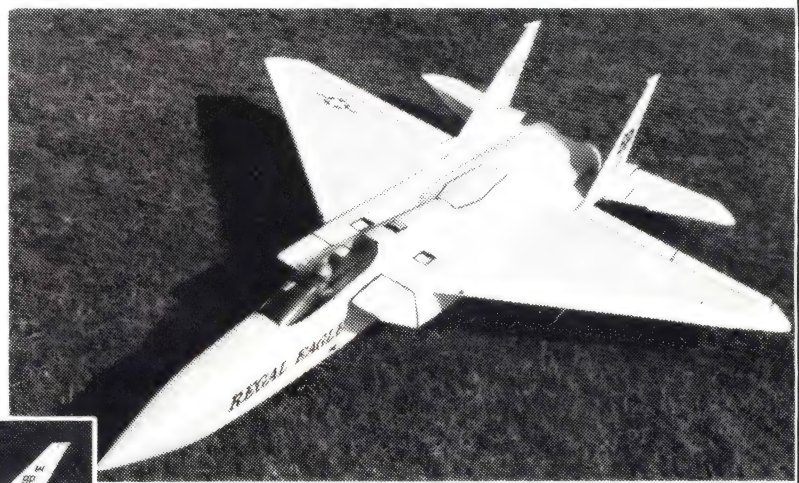
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Design Considerations for F3D PYLON RACING PROPELLERS

by Stuart Sherlock

THE QUEST FOR POWER

The current generation of F3D pylon racing engines produce their maximum power output in the rev range of 26 to 28 K. While the power developed is very impressive: up to 3 BHP (2.1 kW); less than 70% of this power can actually be used to generate thrust. This is a result of the fact that small propeller diameters and high rpm lead, inevitably, to inefficient propeller designs.

As if these factors alone were not bad enough, the engine power curve resulting from use of a tuned pipe is a poor match to the power absorption properties of the propeller. Many engine tuners pay scant regard to the needs of the propeller, tuning the engine for maximum power output regardless of rpm. Having achieved a power increase of perhaps 30%, they are then disappointed when their race times improve scarcely more than a second or two. The power has been developed for sure, but it has not been converted to thrust.

This failure presents a challenge to the propeller designer. Perhaps some way can be found to by-pass the laws of physics, some trick airfoil or new twist of the propeller blade. Well, maybe. A propeller (fixed pitch) can be optimised for only one set of conditions. Given the design point for airspeed, engine power, rpm and diameter, the propeller design is more or less carved in stone.

However, in F3D there exist **two** different design points. The first, and dominating, requirement is that the propeller load be such that the engine can come up on pipe reliably with the aeroplane stationary on the ground. The second is that the propeller generate the maximum possible thrust at some 170 mph in the air! Bend the laws of physics, maybe; but tie them in knots? These requirements cannot be met optimally with a fixed pitch propeller. The reason for this is instructive.

SOME AERODYNAMICS

The airflow over the propeller on a stationary aeroplane is quite different from the airflow in flight. The propeller on the stationary aircraft is acting at a much higher angle of attack, and draws air inward radially at the tips, even from behind the tips, and expels it behind the inner disc of the prop. The power absorbed by the propeller, for a given rpm, is 25% greater under these conditions.

Power is going to be lost somewhere in the necessary compromise. Since the engine must come up on pipe, the loss is going to be in air speed.

Some definitions are helpful in pursuing this discussion.

PITCH. This is the angle between the chordline of the propeller airfoil at a given station and the plane of rotation of the propeller. Alternatively, it is the amount that the propeller would move forward, in inches, during one revolution if it advanced along the chordline.

The definition is valuable, but the pitch may vary along the blade. The pitch is then termed Non-Helical. In this case it is useful to specify the Nominal Pitch, often abbreviated back to Pitch, which is the pitch measured at 75% of the radius out from the hub. Thus a Supercool 8 x 7 F3D prop has 7 inches of pitch 3 inches out from the hub, but may have more or less pitch elsewhere.

The choice of 75% radius is not entirely arbitrary. For most propellers the maximum thrust also occurs at 75% radius, so the aeroplane's speed will closely follow the Nominal Pitch.

Unfortunately, this rigorous definition, used in full-size aircraft, is not always carried over to model aircraft propellers. Commonly, the pitch given by the manufacturer may be the Face Pitch, which is measured to a tangent at the bottom of the airfoil rather than the chordline. Commercial model propellers are rarely helical, and quite often do not even have the correct Face Pitch. So, pylon flyers, beware: without a pitch gauge you are lost.

POWER ABSORPTION COEFFICIENT. The energy released by burning fuel is to be converted into the energy of moving air. Thus, while the engine must generate power, the propeller is required to absorb that power.

An instructive relation between power absorption (P), rpm (n), diameter (D), air density (ρ) and the power absorption Coefficient (C_p) is:

$$P = \rho C_p n^3 D^5$$

Note that P is the power absorbed by the propeller in the process of generating thrust. Because of the third and fifth powers involved in this equation, a small change in either rpm or diameter can make a big difference in the power absorption.

The coefficient C_p would, in an ideal world, be a fixed number. However, with the high tip speeds of some F3D propellers, compressibility effects mean that C_p is a function of Mach number. Where the thrust is typically a maximum at 75% of the propeller radius, with an F3D prop the power absorption is more likely a maximum at 90%. This, of course, is undesirable, as it implies that near the tip a large amount of power generates only a small amount of thrust. This indicates the very poor efficiency of F3D propellers.

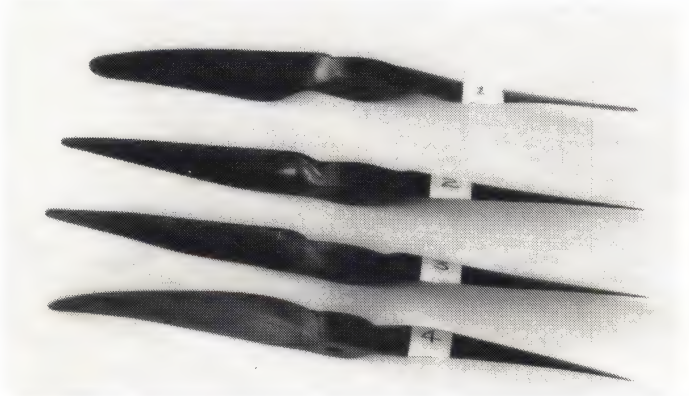
The two quantities defined here, Pitch and Power Absorption, determine the characteristics of the propeller. Essentially the aeroplane's speed is determined by pitch. Then, for a given pitch, the power absorption determines the size of the load than can be drawn along at that speed by the propeller. In a fundamental way, the power absorption is determined by the blade area of the prop. To reduce the power requirements of the propeller, reduce the blade area.

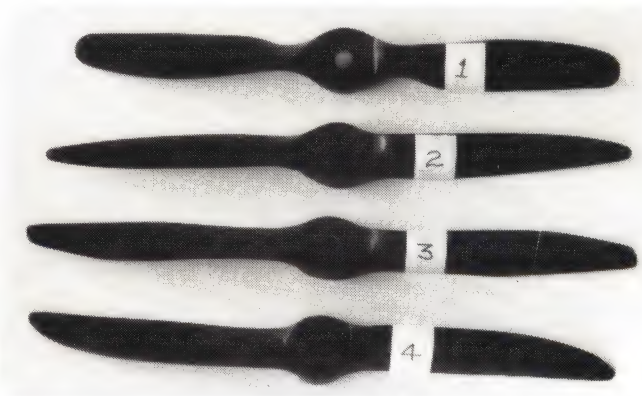
Now, before the propeller design can be considered in detail, two aerodynamic effects must be reviewed. These are related to the Reynolds number and Mach Number.

Without wishing to be too dismissive, the **Reynolds number,** being over 120,000 for F3D props, does not give rise to significant effects. Thus, the variations of Reynolds number along the blade, and with chord, are not, in the context of F3D propellers, considered to be important. Possibly they lead to higher than expected drag coefficients, but that is all.

By contrast, the **Mach number** effects are very important. F3D propeller tips can reach Mach .9 quite readily. At these tip speeds, approaching 680 mph, strange effects are present in the airflow around the propeller airfoil. These effects are covered by the terms Compressibility and Shock Wave.

When an airfoil moves forward it presses on





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No. 2 - John Goodwin's Amberley prop. Concave rear face. Tip washed out 0.2 inches and reduced tip area allows motor up on to the pipe. Diameter 7¾ inch, pitch 7 inch. Good performance despite minimal tip rake.

No. 3 - Helical pitch distribution. Diameter 8 inches, pitch 7 inches. Airfoil is concave to 85% radius then changes to biconvex at tip. Leading edge raked to avoid shockwave formation. Pipes readily, and allows 3,000 rpm increase in the air.

No. 4 - Diameter 7¼ inches, pitch 7¼ inches but washed out from 8 inches at 40% radius up to 7¼ inches at 75% and 6½ at tip. Narrow, raked tip to give easy piping. High pitch towards blade root intended to limit the excessive wind out of the computer designed prop.

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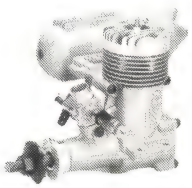
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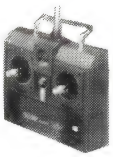
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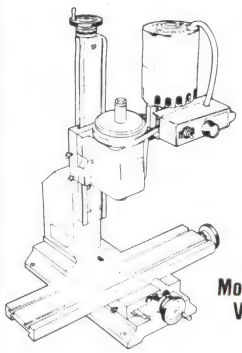


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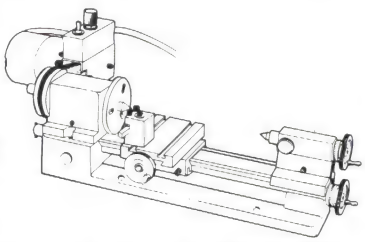
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the air in front of it and pushes it out of the way. At 100 knots this applied Impact Pressure is of the order of 30 pounds weight per square foot. At 600 knots (690 mph) it is 1500 pounds weight per square foot. At 100 knots the air is fairly readily pushed to one side. At 600 knots the air cannot move aside fast enough and is thus compressed, increasing its density.

This compressed air, being pushed along by the airfoil, effectively changes the shape of the airfoil, at least as far as the free stream flow is concerned. This gives rise to some really interesting effects.

For high Mach numbers the airfoil angle of attack, camber and thickness to chord ratio (t/c) all behave as if they have been increased. These changes dominate the power absorption properties of the propeller. This increase due to compressibility is given in good approximation by the Glauert-Prandtl rule. This rule states that the lift coefficient increases by the factor $1 / \sqrt{(1 - M^2)}$ where M is the Mach number.

In the case of a propeller, M is the vector sum of the aeroplane's speed (S_{Plane}) and the speed of the rotating airfoil ($S_{Airfoil}$) divided by the speed of sound (a).

$$\text{i.e. } M = (S^2_{Plane} + S^2_{Airfoil})^{1/2} / a$$

For example, if M = .8, the correction factor is 1.6; i.e. the airfoil behaves as if it were 60% thicker and had 60% more camber, Also, the angle of attack is increased by 60%.

This is alarming. While a 10% thick airfoil may have reasonable drag at M = .8, a 16% airfoil has a great deal of drag. Also, since the Mach number varies along the blade, a propeller that is geometrically helical in pitch is not so in the aerodynamic sense. Indeed, the pitch at the tip appears to increase; i.e. is washed in, and may be expected to generate strong tip vortices.

As if all this is not bad enough, it is probable that shock waves form near the tip. Airfoil data for Mach numbers above .7 show a sudden and extreme rise in drag. Assume for the moment that this is due to shock wave formation. Shock waves form when air travelling at supersonic speed slows to below the velocity of sound. Aft of the shock waves the airflow tends to separate from the airfoil, and this is responsible for the large drag increase. A means of eliminating shock waves is desirable.

Consider that, for a given airfoil, the shock wave forms at M = .7. Clearly then the local velocity of the airflow has exceeded M = 1 in passing over the airfoil, otherwise no shock wave would have formed. The ratio of local velocity to free-stream velocity is then 1/.7 or 1.4.

If the propeller has sweep-back, then the local velocity may be split into two components: one span-wise and one chord-wise. Only the chord-wise component can contribute to the acceleration of the airflow, and this is reduced as the sweep-back increases; to a point where the shock wave can no longer occur. For a sweep-back angle Λ this is when

$$\Lambda = \cos^{-1}\left(\frac{1}{1.4}\right)$$

This problem is relevant only to the outer 15 mm or so at the tip. Provided that the tip has some rake and is rounded, the matter is sufficiently accommodated. A second effect, termed Tip Relief, is actually working in favour of the propeller! Because there is no airfoil beyond the tip (obviously!) the pressure loading at the tip is reduced. Consequently, so are compressibility effects.

DESIGN PARAMETERS

The foregoing aerodynamic theories now provide a framework for the design and analysis of F3D propellers. In the first instance it is tempting to design the most efficient propeller possible, given the horrible set of constraints imposed by a high revving, piped 40. Just what are the features of such a propeller?

- Non-helical pitch distribution. In order to counter the change in angle of attack at high Mach numbers, the tip must be washed out.
- Progressive airfoil. Given, say, a Clark Y section at 40% of the radius, the camber and thickness to chord ratio of the airfoil must be reduced progressively out to the tip; i.e. the tip airfoil must be thin and symmetrical.
- Chord distribution. The distribution of blade area must be such as to give minimum induced loss; i.e. to reduce the tip vortices. This condition is satisfied when the velocity of the propeller slipstream is the same at all stations along the blade.

These considerations give rise to a propeller of nearly constant chord with a well rounded tip, just like that on a P51 Mustang (surprise!).

With these considerations in mind, a propeller was designed to absorb 2.8 BHP at 27,500 rpm, when the aeroplane was doing 160 mph. To minimise tip losses diameter was held to 7⅜ in. The propeller was then designed by a computer, using the Larabee algorithms with corrections for compressibility, air density and shock waves.

The resultant propeller had quite wide blades but was otherwise pleasing in appearance. Time came for testing the prop and, to my horror, no-one could get the prop up on the pipe without substantially reducing the chord.

Recently, however, Ian Haig achieved sufficient off-boost torque to turn the full propeller, and was kind enough to test it using his in-air tachometer. Ground revs were satisfactory at 24k, but in the air the motor unwound to over 29k and had to be shut down to avoid destroying the OPS 40.

The pitch distribution of this prop was 7.5 inch at 40%, 6.8 inch at 75%, and 6.5 inch at 100%. Clearly, the nominal pitch of 6.8 inches was insufficient, as Ian's Mustang can easily exceed 160 mph. However, that the motor should wind out nearly 2000 rpm past the design rpm is surprising. Recall that power absorption goes with the cube of the rpm. Clearly, the design of the tips was very successful in reducing transonic drag.

In complete contrast to this propeller is one designed by American, Gary Gau, who recently graced out Nationals at Amberley. This propeller, used so successfully by Bruce de Chastel (1:15!), appears to have been designed to be inefficient! The tips are washed in geometrically, the geometric pitch rising from 7.5 inch at 75% to 8 inch at the tip. To enable the motor to rev at all the tips are very narrow chord. Despite careful thinning of the tips, the thickness to chord ratio is still high.

This propeller was tested by Keith Harvey, using Paul Classon's telemetry. As was predictable, the prop wound out only 2000 rpm in the air. Hardly surprising considering the compressibility effects noted earlier. So here is a propeller designed to completely different criteria.

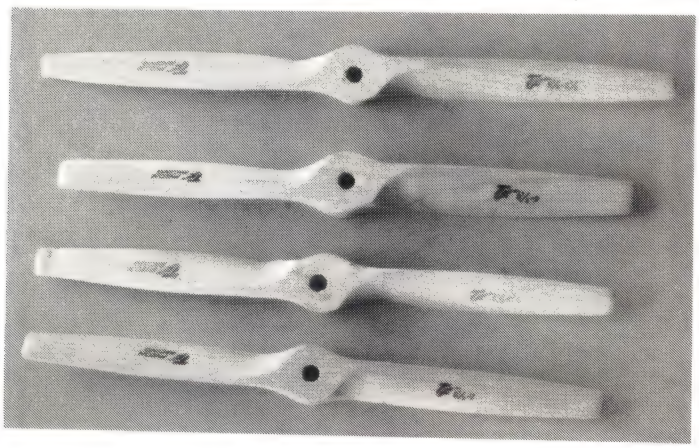
Gary Gau admits that the propeller is designed to limit the in-air rpm. The reason? To prevent the motor from breaking! This is the old story of the mis-match between power absorption of the propeller and the power curve of the pipe-engine combination. A propeller reduced in size to allow the engine to come up on pipe provides too small a load in the air.

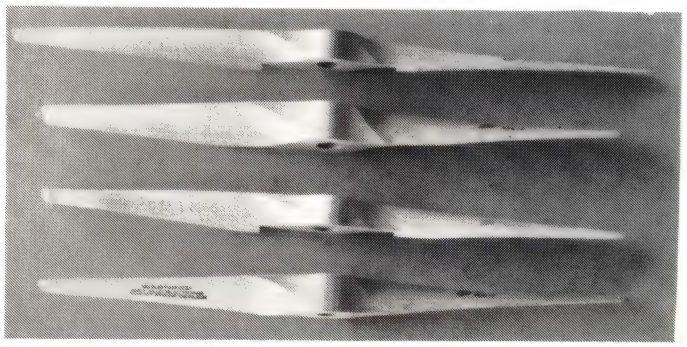
Lying between these extremes are the Supercool helical pitch propellers: the 8 x 7 and the 7⅝ x 6.5. These propellers have reduced camber at the tip as their only concession to compressibility. They typically wind out 3,000 to 4,000 rpm in the air, as determined by Tim Haynes' teletacho in his Super Tigre powered Midget Mustang. Neither propeller is the optimum; there is room for improvement in both.

TIME FOR CONCLUSIONS

Given the foregoing theory and observations, just what criteria are relevant to prop design, and how can they be achieved? For any given motor, regardless of its state of tune, these criteria are:

- The propeller must allow the motor to come up on pipe reliably.
- The propeller must produce maximum thrust and acceleration in the air without over-revving and breaking the motor.





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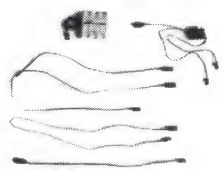
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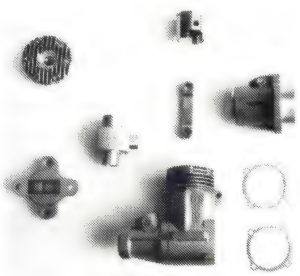
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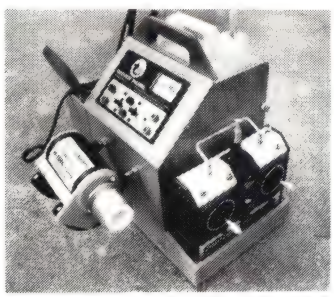
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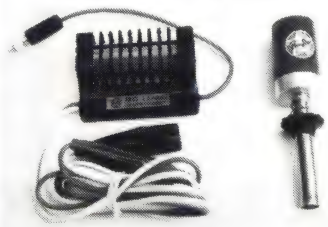
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To achieve these criteria, the following rules of thumb may be followed:

★ DIAMETER. The diameter is chosen so that the tip speed does not exceed M = .85. Anything from 7⅜ to 8 inches diameter is typical.

★ NOMINAL PITCH. This is a compromise between speed and acceleration. Anything from 6.8 to 7.5 inches at 75% seems to be satisfactory.

★ PITCH DISTRIBUTION. Helical. This will limit the rev wind-up in the air, albeit with a loss of efficiency.

★ CHORD DISTRIBUTION. Similar to P51. Parallel blade with rounded tip. Gives minimum induced loss.

★ CHORD GEOMETRY. Sweep-back required over the last 5 mm at the tip, but not excessive. Crescent shape is ideal. Eliminates shock wave formation.

★ BLADE AREA. Reduce until the engine comes up on pipe reliably.

★ AIRFOIL SECTION. Undercambered Clark Y type at the root changing progressively to fully symmetrical at the tip, to give zero camber. Start with 17% thickness to chord ratio ourboard of 75% and reduce thickness until the engine winds out to the required amount in the air. The extreme tip edges which form the crescent tip should be sharp to drive the vortex outboard, thus increasing the span loading. Airfoil high-point outboard of 75% station should progress to 50% at the extreme tip.

★ MATERIAL. The choice of materials is between wood, glass and carbon. Neither wood nor glass have sufficient strength or rigidity to match the rules of thumb given above. This leaves carbon, laid in a good, hard, high temperature epoxy, as the material of choice.

★ SUPPLIER. For those not wishing to mold their own propellers but wishing to experiment, a good starting point is the Supercool 8½ x 6.8 carbon prop. This prop, made to order for John Duggan in various forms, has won nearly all the major F3D contests over the last three years, mainly on the models of Ian Haig, Ranjit Phelan and Roger Langham. The airfoil section is sufficiently thick to allow repitching; chord is adequate; and there is plenty of diameter. Available from Supercool Racing Propellers; (02) 607 3307.

Other props, to suit various motors, are also in production, including Gary Gau's 7¾ x 7½ and John Goodwin's 7¾ x 7. Others come and go, to order.

The foregoing theory and observations appear to be sound. They provide a basis for experimentation, and should lead to improved performance. The author is the Chief Executive of Supercool Racing Propellers, and is happy to talk propellers at any time. You can phone him on (02) 607 3307; or write to 5 Hebburn Place, Cartwright, NSW, 2168.

LOW FLYING **by Harley A. Boulton**

While radio controlled aeroplane clubs are not very common in New Zealand, in Papua New Guinea they are a rarity. But should you visit a dirt airstrip in the jungle near the border with Irian Jair, you may be privileged to see possibly the smallest and most isolated model aero club in the world.

On the occasional Saturday afternoon, when the heat has died and the wind become nearly dormant, John Marsh, who has spent many long months making his model, will put on his special T shirt and bright captain's cap, then head off with one of his radio controlled planes under his arm. A crowd of Nationals soon joins him and his two sons in clearing a small patch of the airstrip of all its small stones and rubble. His audience sits patiently as John systematically checks the controls. It is not a time to rush things. Then everyone holds his breath as the little motor roars into life and propels his red and white craft down the path, then roars off up into the sky.

To them it is sheer magic that the little control box in John's hands can send secret messages to make the craft bank to turn, slow up to glide, or race into a power dive, scattering all the young boys who have come too close.

Once an unscheduled passenger plane arrived during John's flying, so John made an emergency landing on the nearby so-called soccer field. Fortunately the game had no started, as toes and sprigs do little to improve aircraft designs.

John laughs when he recalls the time his precious plane ran into a large Nga tree. (Naturally he blames an unexpected cross-wind.) The Nationals nearly all went into mnourning as they thought that the little man inside must most certainly have been killed or very seriously injured. But, like all serious hobbiests, John was not beaten by this set-back. It took months for parts to come from overseas so that the hands of loving care could restore the little red and white plane to flying condition and the little two-stroke could break the silence of the tranquil sky again.



Tristan Lawrey, son of VARMS secretary, releases his Hangar Rat at the VARMS indoor fun fly, early in May. The evening was a great success, with members from several clubs. This photo by Tim Morland. Report from PRO Jim Robertson. Good one, eh Max?

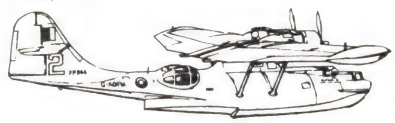


John Payne, Expert Class winner at Wagga early in '88, with fuselage prize donated by Peter Goldsmith. Henry Hutchinson on left. Pattern makes them happy! Photo from Tom Bloodworth.

WET EXCUSE

For those who don't know, many parts of the east of Australia had abnormally wet weather for the first half of the year. And that's putting it mildly! One rain-free weekend in six months is not really conducive to outdoor activity. Most sports suffered badly, including model flying. Just ask any model shop owner. Kits were selling but fuel wasn't, and enquiries from newcomers were down. Blaming the situation on global warming, council drainage or the devil himself might make good conversation, but it doesn't get you in the air. As I write (mid-July) it actually hasn't rained for a whole week, but the damage has been done. Even if the field proper is dry, the access track is often like the Birdsville Track in the wet season. Strictly 4WD territory. Last time I flew I spent an hour at home getting mud off the car. This does tend to dampen spirits somewhat.

All this is a long-winded excuse for breaking a promise. The flying report on the FW190 equipped Magnum 91 four-stroke (see review last issue) hasn't been done because the model just hasn't flown yet. It's been sitting on the bench for weeks now, raring to go but grounded because of the weather. In my younger exuberance I may have travelled far and wide for a test flight, but nowadays I will just beg forgiveness and ask readers to hang on until next issue. *Is that a promise, Mel?*



PBY-5B Catalina

AFTER THE CONTEST

"Home at last, drawn and tired,
Another day is done.
Why do I do this crazy thing?
I guess it must be fun!"

Anon

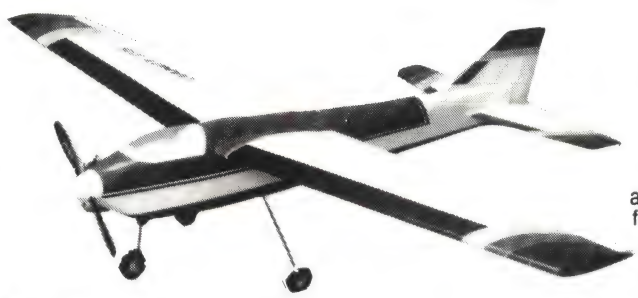
From the Brisbane Free Flight Society Newsletter July 1989.

Mel Gillott
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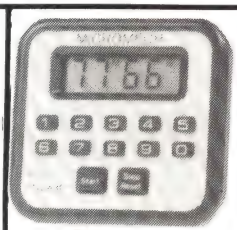


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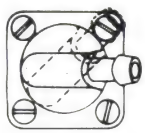


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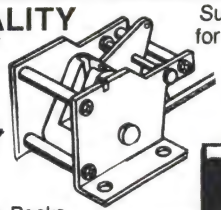


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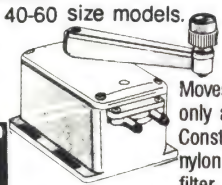
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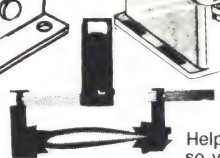
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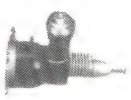
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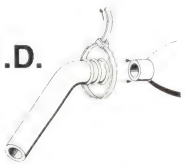
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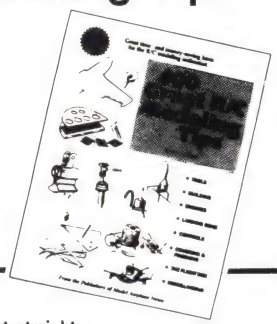
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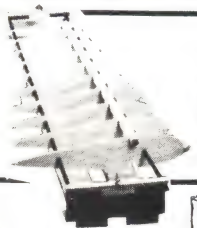
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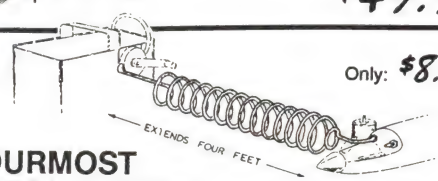
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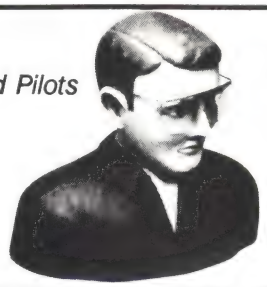
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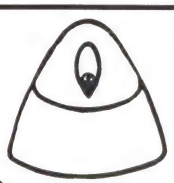
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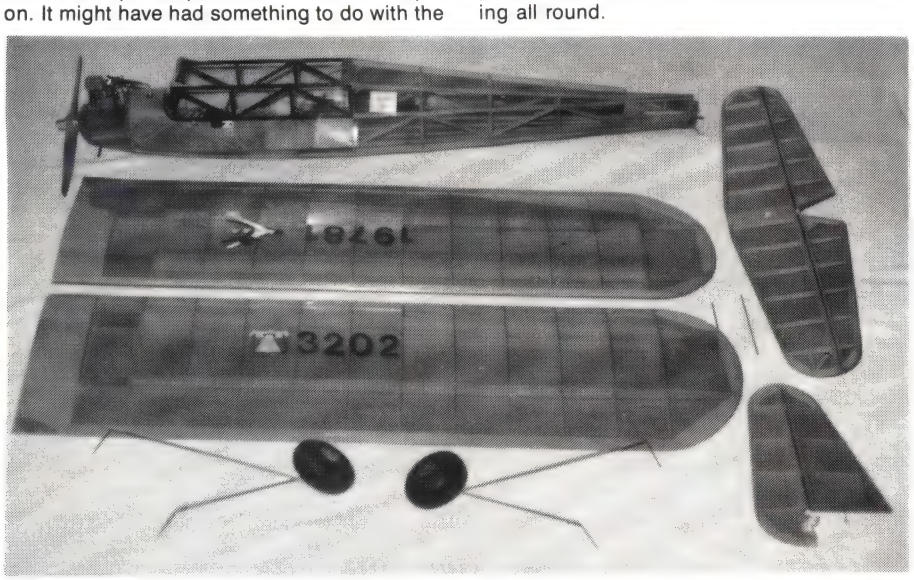
OUT FOR A DUCK

There is only one aircraft better than a biplane, and that is a biplane with floats. Due to my bias in this direction I sneaked a few hours off on Sunday May 14 (I know, Mothers' Day, but my Mum now keeps an eye on my models to see that I don't fly too high, and she has a view from above all) to attend the first Sydney Float Fly. The event was hosted by UMAC of St. Marys under the guiding hand of Tim Nolan. The venue was at Chipping Norton, east of Liverpool off the Georges River. Chipping Norton is a very pleasant development of modern homes and riverside parks where the land has been moved around to provide artificial inlets in the form of lakes, the shores of which are landscaped for picnics and pleasure. A perfect flying area.

As is often the case when a Utopia is found, there is one minor (?) problem with this area. It is directly under the flight path of aircraft approaching Bankstown airport! You can imagine the paperwork that went into organising the permissions to hold this (possibly) annual event. Nevertheless, Tim Nolan was up to the challenge, being an old hand with said paperwork (he wears a hat the same as mine), and all problems were ironed out, and finally, tentative permission was granted, subject to the results of the day. Word was spread, and the response indicated to the host club that there was a fair chance of 20 to 25 models being flown on the day. Now, here in Sydney we have been offering the approproate sacrifices to Thor, the thunder god, as we have had continual rain for yonks - a long time - and speculation was that this trend would continue on the day. Well, the clouds hovered, but not a drop was spilt, so the weather was spot on. It might have had something to do with the power of positive thought of so many modellers, as the attendance was not the expected max of 25, but 44 modellers, with a total of 62 aircraft of all shapes and sizes.

All facets were represented, including sport, pattern, scale, old timer, control line, and even an 'almost' free flight. Modellers came from all points of the compass, far and near, and many past friendships were rekindled. Even after the shock of almost triple the expected attendance, the day was very well run and the efforts of the UMAC must be lauded for a great success. with no problems, complaints or dangerous practices. Within seconds of the pilot briefing models were scudding across the water and heading for the 300 foot ceiling. Tim Nolan was like a clucky hen watching ceiling heights, maintaining safe practices and keeping spectators out of the roped-off pilot area.

The safety message was paramount to all who attended, as there were 44 safety officers (all the flyers) offering advice and keeping a close eye on the proceedings throughout the day. This vigilance was most apparent when the 'almost' free flight model took off. It was designed as a radio control model but, as the engine was idling ready for take off clearance, a gremlin chewed into the throttle servo and pulled the engine full on. The instant torque reaction of the engine spun the model around and it commenced the wildest series of doughnuts and wingovers you ever saw. Co-pilots guided flyers back up the beach away from the frothing monster, and safety officers were everywhere clearing the area. I don't know how the model took the pounding as it catherine wheeled from one wing to the other, throwing water in all directions except down the throat of the engine as the beast continued to roar at full song. The pilot was pushing the sticks like a woman knitting bootees for a set of triplets that should have been a solo birth. Just for an instant the model landed correct side up and the pilot had it in the air. Great clapping and cheering all round.



The Dallaire 75% (80 inch) dismantled for transport. Complete separation of components enables safest packing. Covered in transparent yellow IOF. Different numbers — one for MAAA and one for SAM.

Some other highlights of the day were: the flight of the yo-yo; perfect take-off and landing on water with a nice bi-plane; an electric model with twin, counter-rotating props that was nothing short of magnificent on the water and in the air, built and flown by Bob Meyer of Tamworth; a 120 OS FS powered Loening with hundreds of flying hours in its log, by Eddie Oakes; Les Donovan's superb Dornier DO 19 that looked 'really real' in the air; Tim Nolan's 9 foot span Cub powered with a modified Tartan twin and flown by Wayne Hadkins, who showed just how it should and could be done; and the spectacular dogfight in which a cowardly hunter set upon Peter Abell's Bi-Fly while it was 'at rest' on the water and chewed it up something horrible. "Darned un-sporting. Should take 'em on the wing old chap!" Frank Percy really needed only a damp area for his chopper when he put on a good display of aqua-coptering.

This will probably cause me to be splattered with diesel fuel and be pelted with burnt-out glow plugs as I confess that I was really impressed by the electric model flown by Bob Meyer, but don't take this as a sign of going soft! When they fit contra pistons or valves to the motors I might sit up and take notice but, at this stage, they are nice to look at when flown by somebody else. Shame about the noise they make!

An event like this is not a one man (person) band and required the energies of lots of people, whether they were interested or cajoled into helping. I don't have a comprehensive list of names so, well done all you 'behind the scenes' people, and a double pat on the back to Carol Nolan and Gabriel Hadkins for the excellent job of registration and raffle (cajoled?), and the Potters who fed and watered the multitudes.

The prize for the best model was shared by Eddie Oakes (Loening) and Les Donovan (Dornier), and the prize for the best crash-splash of the day went to Peter Abell (Bi-Fly 25). As everybody was very busy enjoying the day and I obeyed the flyers' only rule in the compound, all my photos were taken with a long lens, but I was not able to record details. You will just have to enjoy the piccies and provide your own oohs and ahhs and guess what they are.

The event will be on again next year, so get building and planning. I guarantee that you will enjoy yourself.

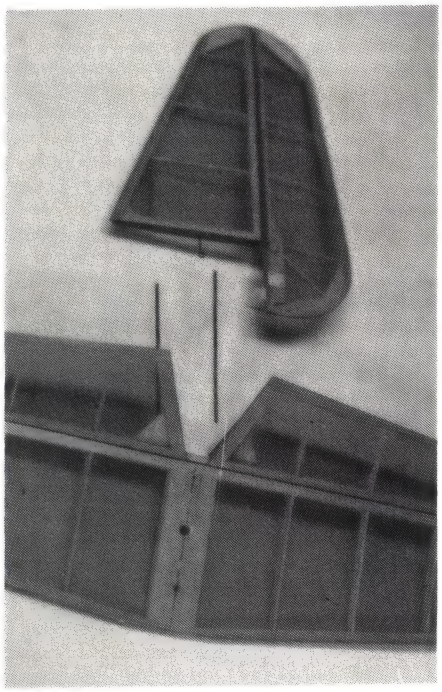
AND NOW FOR SOMETHING COMPLETELY DIFFERENT

Do you remember that a little while back I told you about Allan Trinder and the mods to the OS four stroke for the old timer model? I also mentioned that he was making some excellent kits of old timers that are all approved for SAM competitions. (I did mention that, didn't I?) Well, I have a special interest in the kits, purely from an engineering point of view (engineers DO work with wood), mainly from the point of view of the jigs, form cutters and sanders and other things mechanical. I have made a few special tools for Allan, and been happy to discuss ideas with him on 'what would be the better way to do it' projects. So far he has 100 orders for the Dallaire 75% kit, and mine was #32 and I now have it. So, while I was straying off my usual beaten path, I will maintain that tack (nautical term, for you

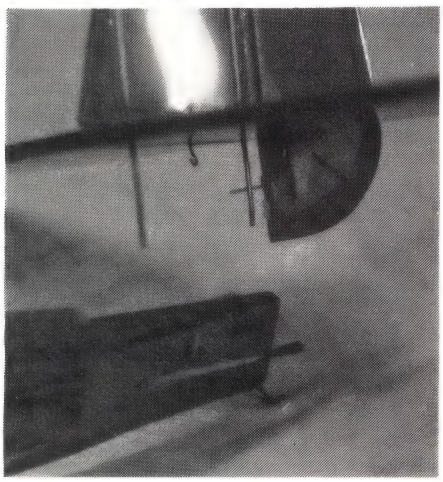
non-mariners) and give you some of the inside information on a kit befitting a discerning modeller. (Yes! Yes! I know the Gillo chap usually does the kit reviews, but he also slips in a few engines at times, so, tit for tat. Besides, I have the kit; he doesn't!)

At this moment Allan, his wife Anne (driving force behind Allan) and Scott, their son, collectively registered as Old Fashioned Hobbies, have four kits available: Buzzard Bombshell, 72 inch; Playboy Senior, 80 inch; Dallaire 75%, 80 inch; and Dallaire 50%, 53 inch. All the kits are the same in presentation but, as I have the Dallaire 75% on hand, that is the model that we will look into.

Old Fashioned Hobbies' DALLAIRE 75%



Tailfin is located by two wires that pass through, and also locate, the tailplane. Note hook on bottom of fin. Rubber band passes through large tube in tailplane and fuselage to retain tail unit. System requires very accurate construction, and close fits of separate parts. Clear access to control horns needed for hooking up.



AN IMPORTANT POINT

Before any of you start jumping on the spot, the top spar on the wing of this model is BELOW the top edge of the ribs. This is as the original design of the model, and it has been faithfully reproduced in proportion in the kit to abide by the rules of competition. I don't know if there is a specific reason for this, so perhaps our resident aerodynamicist might like to make a comment.

The Kit

The aim of the company is to direct all costs into the quality of the kit, so don't expect fancy boxes; kit boxes don't fly. At present the kit is like one of THOSE types of parcels you purchase from one of THOSE shops; in plain wrapper. It does have the name roughly written on the end in felt pen, and future kits MIGHT have a cheap photo-copy label stuck on the front of the box for the purpose of display in shops.

The BALSA. Allan buys all his balsa in bulk from Balus in New Guinea. Not the bulk packs you see advertised in this magazine; we're talking in thousands of dollars bulk packs. He carefully sorts through the bulk packs to select the density and grade of wood he requires, and this is stored for future use. As he can't use all he buys (bulk buying contract), the excess is offered to model shops for stock sales. Where you have two identical pieces in the kit, say wing spars and trailing edges, a pair is cut from one piece of wood and end marked in pairs for each kit. By doing this both wing halves will have timbers of identical grades, weight and density for balance of weight and strength. The ribs come to you looking like a solid block with a recess cut in the middle. The method of manufacture is to cut the sheet of balsa into rectangles to suit the rib size. The pieces are all set in a jig, and thin, locating rods are inserted right through. The shape is cut on a bandsaw and then sanded on a profile sanding drum to super fine finish. Two or four ribs, depending on the model, from the stack are re-jigged on the locating pins and sanded to a smaller size for the centre section, and, when finished, placed back in the centre of the original stack so that every factor matches perfectly.

All the components of the kit are cut and sanded to exacting finish size, even to the sheer webs that are guaranteed to be so accurate that you can set the spar widths with them if you so desire. The half round formers are all neatly notched for the stringers (I hate cutting out those notches) and the longerons. Really, it is almost a 'just glue together' kit, as cutting and sanding are all done for you.

The cut and finished engine mounts are made from Ramin pine. (The Winch had a hand here in advice on best timber for the job and cutting the strips in the Winch Woodwork Shop. Nothing but the best would suffice here, so I had to get my Super, U-Beaut, very expensive, tungsen tip planer saw blades out of the safe to do the job.) And here is one of the small sanding jobs that **you** have to do. The bottom edge of the mount has to be sanded to match the cowl when fitted. The top of the mount is recessed to locate the Paxolin engine mounting plate which has the centre marked for you to cut out to suit your choice of engine. The cowl is a masterpiece, made from isothalic resin, and it is easy to see the experience that Allan has here from his years of specialised fibreglass work.

The undercarriage is jig-formed with a special bender that does not crimp the metal inside the bend, which can be a weak spot. No wheels are supplied, as most modellers have an abundance of them in stock or want to make their own lightweight versions. Trexlers would be a good choice if there are no bindiis on your field. The fuel tank is also left to your choice, due to the intended use of the model. On that point, here is a consideration that worked very well on the prototype. The plastic can in which 35 mm film is supplied was inset flush in the firewall as a receptacle for a home-made tank. Easy access, simple, and no chance of fuel leaking inside the model.

The structure of the model (all models in the range) is designed to withstand the tensions of heat shrink films and, indeed, the model in the photos is covered with Solarfilm, so, if you are a purist and wish to cover with tissue or silk, the frame has plenty of structural strength to withstand any reasonable shrinking stresses. The finished model, less radio and engine, deflected the needle on the scales at a mere 38 oz. (old fashioned measurements are used throughout this review as we are, after all, describing an old timer model), which puts it in the "gee that model is light" category. It is easy to understand why these aircraft head for the clouds so rapidly, and float forever.

On test the model, purely as a stress test, you understand, performed a range of aerobatic manoeuvres, including stall turns, loops, rolls, inverted flight and climb from inverted, and a host of other gyrations for which there is no specific description. The test model has two part wings and the pull down empennage, and, on landing, inspection showed all components to be in place exactly as initially set.

I'm not going to do any name dropping, but the list of modellers who have already purchased this or one of the other kits from this stable reads like a Who's Who of the modelling world.

The range of kits available so far covers Duration, Texaco, and the Oz 2 cc event in radio, the Buzzard and Playboy for competition free flight; and all are excellent models for old timer sport radio, free flight or radio assist. The 50% Dallaire would make an excellent free flight model with anything from a .5 cc diesel to any 2 cc engine, and also an excellent model for 05 electric use.

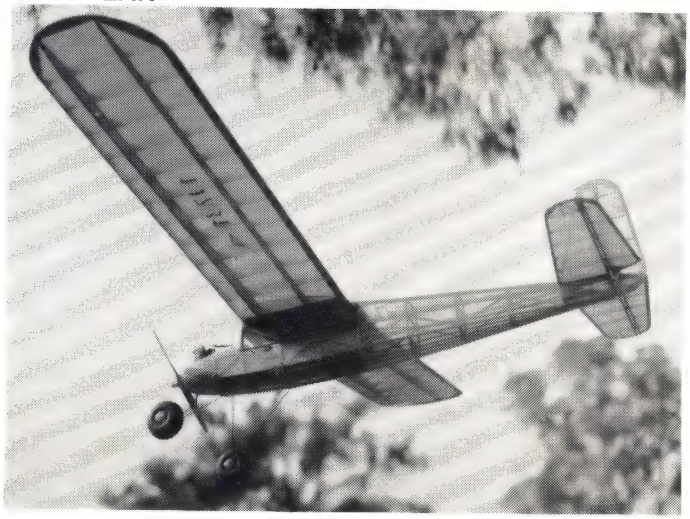
Summing Up

An extremely high grade kit with class A balsa and ply, very clear plan and instructions, hosts of cunning innovations and 'should be obvioius' ideas that become apparent as you start building. The finished product cannot fail to please, as will the price, and it is made in Australia by Oz modellers. I would recommend that you have a couple of build up models fly off your building board before you tackle this kit, to give it fair treatment, but there is nothing to stop new chums buying now while the price is low and storing for later experience. Model Flight of Liverpool and Adelaide are agents, but the kits can also be supplied direct at retail price from Old Fashioned Hobbies on (02) 605 6149.

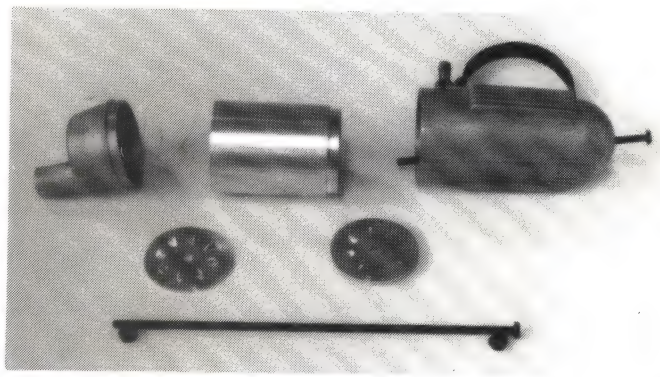
(I'm designing floats for mine for the next Sydney Float Fly. It will be magnificent flying off water.)



A re-cycled car wheel nut from a junk yard. The wheel stud (a bolt) is screwed in, Loctited, faced off, drilled and tapped to suit the engine crankshaft. Result is a spinner nut for a tail-heavy model. This one weighs 60 gram! Winch work with nut and camera.



Gliding in for a gentle landing. A good gliding model wing loading of around 10 oz per sq ft (30 gr per sq dm) makes the Dallaire a fair weather flyer.



OS has had the answer to quieter engines for several years. It is the add-on mute set, available for most sizes in the 2-stroke range. The mute consists of a thick-walled barrel with two perforated plates and a long muffler assembly bolt. It is inserted between the two parts of the standard muffler. The operation takes only a few minutes. With an old OS 25, the Editor found a noise reduction of about 3 dBA, and a more pleasant sound too! However, the power was reduced: rpm decreased from about 11,000 to less than 10,000. The mute weighed 16 gram, compared with the muffler at 34 gram. The cost was quite acceptable, even if the loss of a flying field is not at stake!

Here is an interesting experiment from the wandering engineer, Vin Masters. Pat on the back for your sensible choice of a good design!

A QUIETER NOTE

by Vin Masters

The description of how to make an effective muffler by Brian Winch, in No. 93, posed enough of a challenge for me to try to do something about a noisy model that I had been flying for years, and probably annoying the neighbours, although they wouldn't say so.

Brian's design, wherever the original idea came from, consisted basically of a series of tubes enclosed in a large tube, and held in place by baffles. Without the means of getting baffles to hold the tubes in place, and doubting my ability to peen over the ends of the muffler, I tried to redesign the idea to provide the basic layout of the Engine-ear's design with simple drilling and lathe work.

The actual layout is shown in the diagram. Being unable to obtain a large diameter aluminium tube for the main casing, I used a piece of thick walled cardboard tube lined with aliminium foil attached to the inside with slow cure epoxy.

After the pieces were machined and the fits were checked, I had to use an intermediate step in the assembly. I arranged the end caps and internal chamber to hold the six tubes in place; the caps themselves would eventually be epoxied on to the main body of the muffler. I did not attempt to get all the parts together by balancing them on one end and then shuffling the other end cap onto them, but I epoxied the tubes onto one end cap - the outlet one - and into their recesses in the internal chamber. This sub-assembly, shown in the photo, was held in correct alignment with knobs of blue Tac while the epoxy was setting.

When the tubing section was firm, the Blue Tac was removed and the whole unit epoxied into the body of the muffler, and the inlet end cap was then epoxied in place. I hoped that the foil lining inside the muffler was not wrinkled by insertion of the internal structures, but it seemed to be firmly in place, and the ends were belled internally to give a good clearance when locating the end caps before pushing them tightly into place.

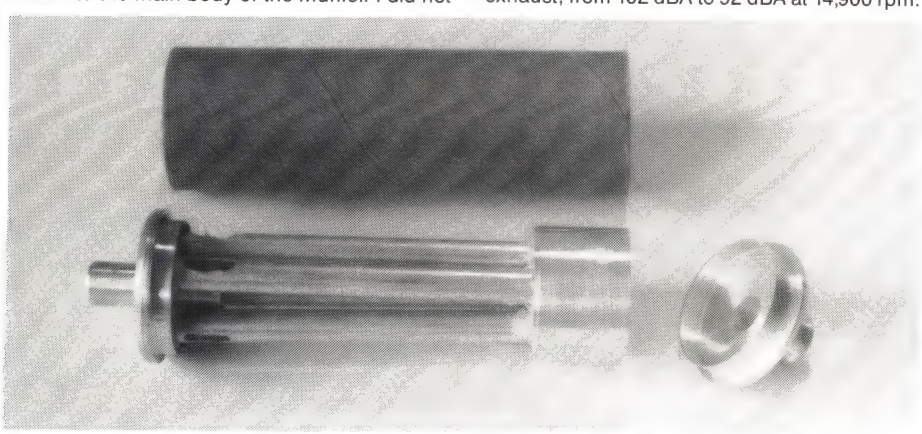
The muffler was allowed to set for several days before it was painted silver and fuel-proofed on the outside, and it was weeks before it was actually tested. It has had little use so far, so I do not know how long it will last and function properly.

The unit weighed 57 gram (2 oz), which I though was fair. I spent 3 hours designing and making it, and that was a disappointment, as an OS muffler unit can be purchased for about an hour's worth of the weekly pay cheque.

The performance was pleasing. It reduced the noise of a Taipan 15, at 14,700 rpm, with open exhaust, from 102 dBA to 92 dBA at 14,900 rpm. Even then the engine seemed to be pretty noisy: without the muffler it was wild!



Recipient of the slowest engine award, at the Veteran's Gathering at Muswellbrook in May, was Harold Stevenson. Spark gap can be examined through exhaust ports, and crankshaft is anchored behind backplate so that 1½ bladed prop will not fly off with power surge!



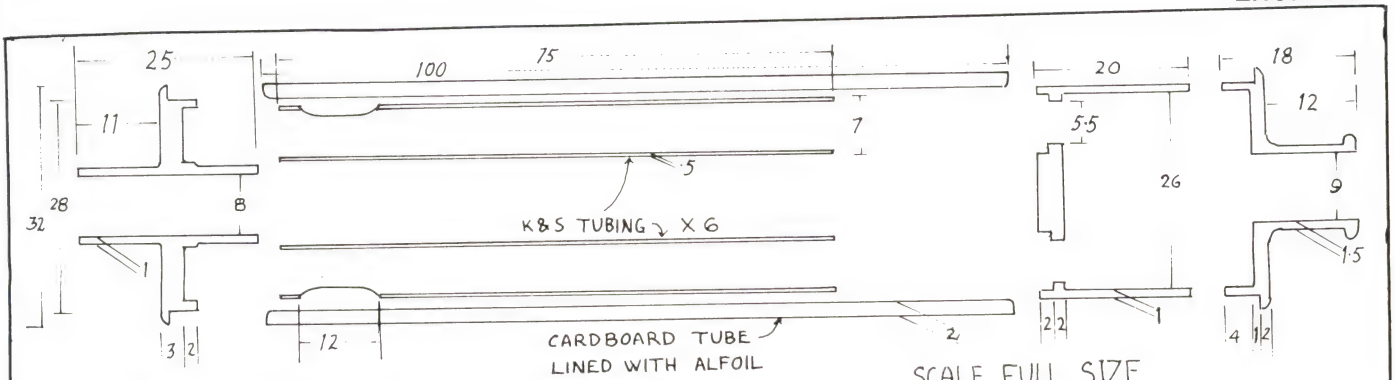
Components of the Masters Muffler, shown after partial assembly. Cardboard body is lined with al foil. Tubes are held between outlet end caps, left, and internal chamber, right, with epoxy. Both are epoxied into the muffler body. Use slow set epoxy. Allow several days before use.

BRIAN'S BRAIN BOGGLER

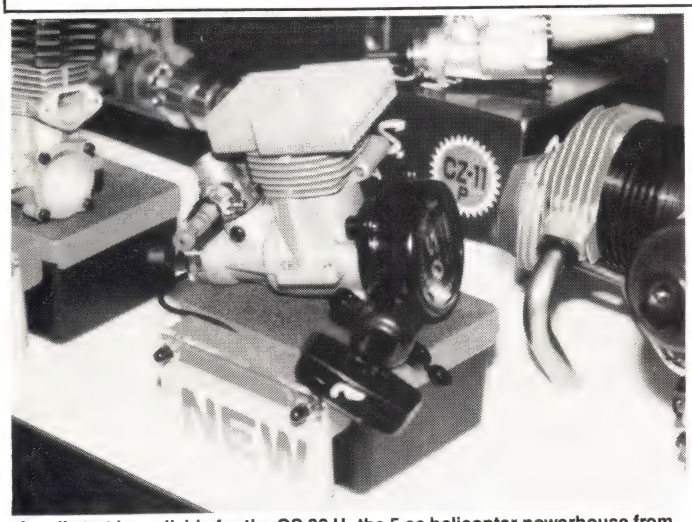
Last month: Weigh 3 + 3 tablets. If 3 + 3 are equal, weigh 1 + 1 and remove heavier tablet. If 3 + 3 don't balance, remove light 3; these are safe; then weight 1 + 1 of heavier side. If equal, tablet left is removed. If unbalanced, remove heavy tablet. Would you have survived? If you would, try this. At a forked road stands a native of one of the two distant villages. In one village the natives always lie; in the other they always tell the truth. You don't know to which village the native belongs and he will permit you only one question. What question will you ask to find the way to the truthful village?

Well, the tech bell is ringing, so I'm off to continue my course on better public relations, but what I have learnt so far is no damn concern of yours.

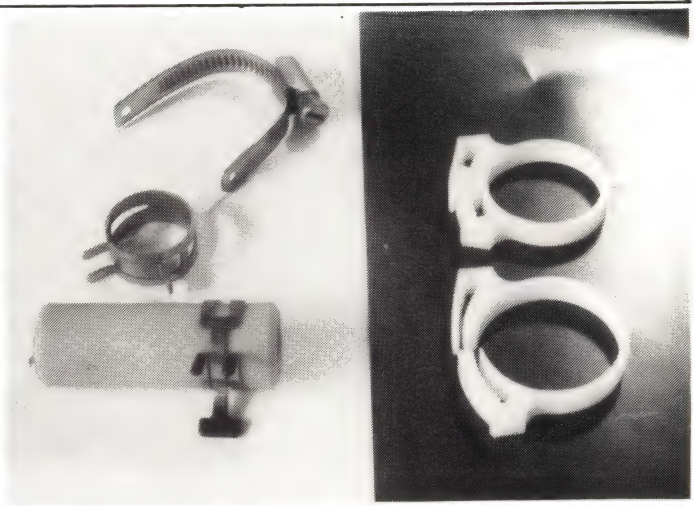
Al Titude.



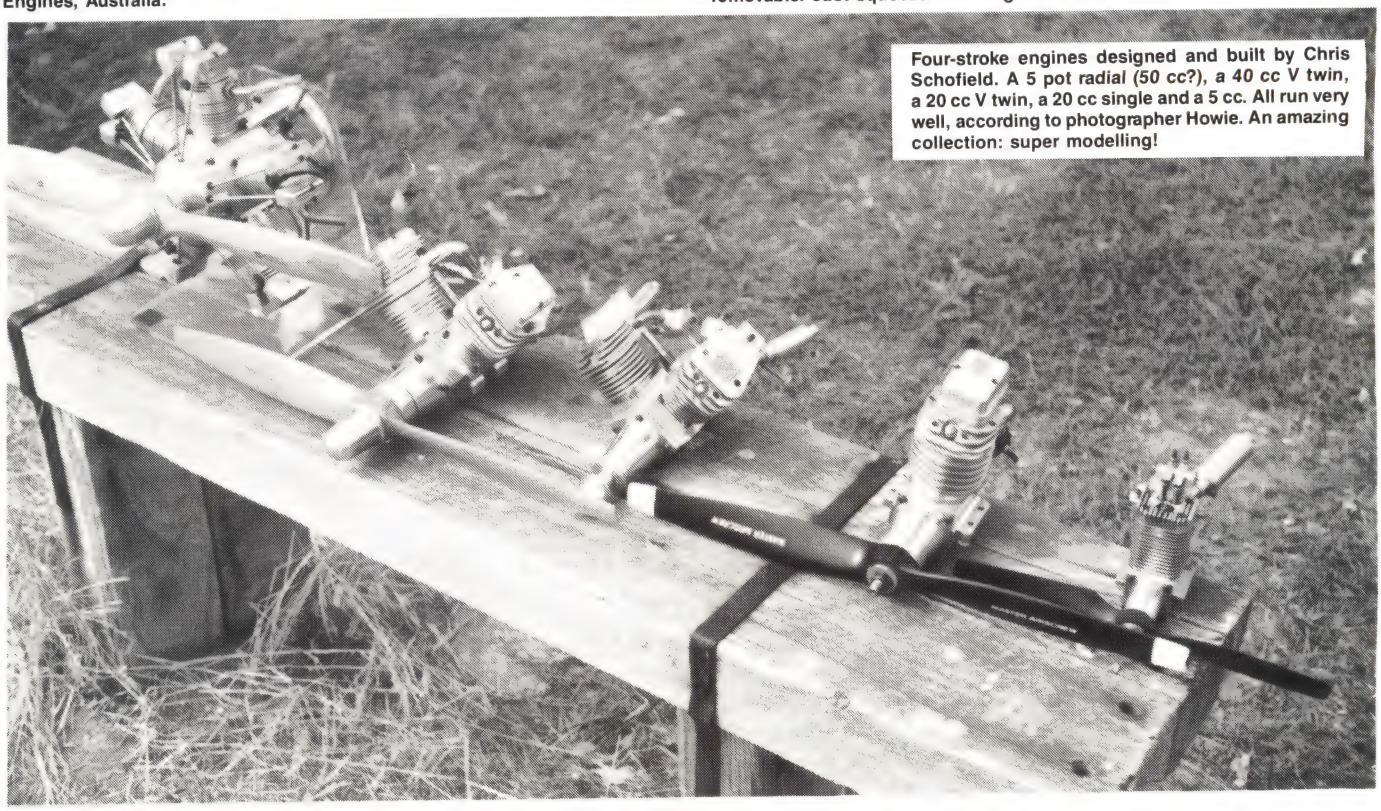
The Masters Muffler: Longitudinal cross section



A pull start is available for the OS 32 H, the 5 cc helicopter powerhouse from OS engines. For easier, safer starting the engine needs to be fitted with a modified crankshaft to take the zip start cog mechanism. Available from Model Engines, Australia.



On the right are the new coupler clamps by Aerotrend, a line of modelling items available from Model Engines. Much simpler than the saddle clamp or circle clamps (also available from Model Engines), heat resistant and removable. Just squeeze them together. Several sizes are available.



Four-stroke engines designed and built by Chris Schofield. A 5 pot radial (50 cc?), a 40 cc V twin, a 20 cc V twin, a 20 cc single and a 5 cc. All run very well, according to photographer Howie. An amazing collection: super modelling!

OS .70 Surpass 4-Stroke

Engine Review

Specifications

Displacement:	**11.50 cc (0.702 cu in)**
Bore:	**25.8 mm (1.016 in)**
Stroke:	**22.0 mm (0.866 in)**
Practical RPM:	**2,000 to 12,000**
Peak Power:	**1.1 BHP @ 11,000 rpm**
Bare Weight:	**570 g (20.1 oz)**
Consumption:	**23 cc per minute**
Prop Range:	**11 x 8 to 16 x 6 (tested 11 x 8 to 16 x 8)**
Fuel Oil:	**Synthetic and/or castor 16 to 20%**

Accessories Supplied: 3 Allen keys;choke extension rod; 3 open ended spanners (one for prop nuts); drilling template for mounting holes.

Extras: OS FS glow plug and OS muffler supplied.

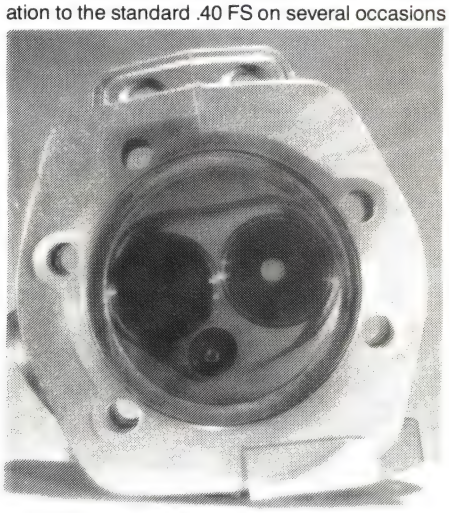
Introduction

Some modellers need something in between the 61 and the 90 four-stroke for a model that became too heavy due to the fancy work and paint job. Well, I have the answer (that is, Mr. OS has the answer) in the .70 Surpass. This is not just a larger engine. The .70 is pure power coupled with reliability and very easy starting. By looking at the internal components it is easy to see that the engine is designed for hard work, as all compopnents are of very generous proportions where strength is required. Let's take a look.

Heading the Story

Some good changes here in the line of performance. Valves are maximum size with very strong springs. OS have been using a C clip to retain the springs on the valve stems, and this has been quite adequate. No doubt due to the higher performance of this engine, they have taken extra insurance by fitting tapered, split collets in a collet cup. This move is in line with full size engine practice, and it is very neatly done. The bronze seat and stem guides appear to be a casting with a hemisherical internal chamber for more efficient gas flow.

The bore of the intake manifold is an oval shape tapering down to the valve chamber in the form of a venturi. I have done a similar modification to the standard .40 FS on several occasions to achieve a marked difference in performance. A soft aluminium gasket is fitted for head to liner seal. The rockers are fully exposed by removal of their cover.



OS 70 FS head with one valve removed. Head screws are not arranged symmetrically. Plug is closer to exhaust valve for better combustion.

Maincase

Superb casting work here, with gussetts in strategic positions. Mounting beams are 5 mm thick. The machining seems to be of an even higher standard than usual; all machined surfaces are like polished mirrors. Heavy duty 15 and 10 mm ballraces are fitted for the crankshaft with sealed ballraces for the camshaft.

The crankcase breather nipple is fitted under the front housing in line with the helical gear on the crankshaft. This would eliminate the normally retained residues in this area, due to a slight pumping action of the gear. It is this area that generally suffers most from fuel residue corrosion, and OS recommend (as I have been doing for years) flushing the engine after the end of each flying session before 'hangaring' the model. I use a mixture of 25:1 petrol and Dexron oil which I squirt in and out of the nipple with a large syringe. One of the beauties of Dexron is that it is bright red, and this is witness to where it has been.

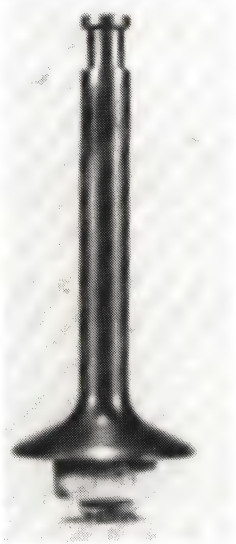
The exhaust pipe is a short elbow threaded both ends and fitted with a locknut on each thread. Either end screws into the head, and the machined muffler screws onto the other end. The rear cone of the muffler is welded onto the main chamber very neatly and the whole unit is an example of fine workmanship. The muffler is very effective, and the wall thickness is such that no metallic ring is noticeable when the engine is running. (This ringing accounts for a fair amount of muffler noise and is due to vibration of thin section material.) A tank pressure nipple is fitted and should be used if you are going to fly any aspect other than straight and level.

Up and Down Bits

Hardened steel liner, cast slipper piston and very substantial conrod which is bushed both ends and drilled for oil entry. The rod is symmetrical in shape, so mark it LIGHTLY before removal so that it goes back the same way. The ring was still dull after all the running that I gave the engine in the test period. This would indicate that the ring will bed in more for a better seal and an increase in performance when fully run in.

Around the Crankshaft

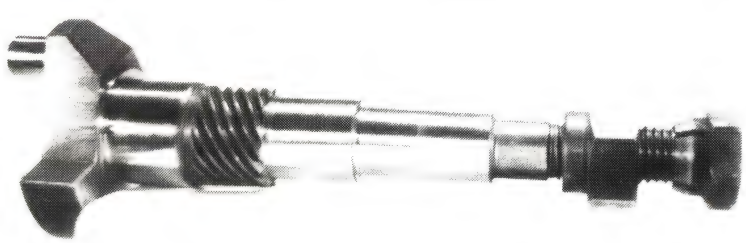
The camshaft, driven off the helical gear on the crankshaft, is a neat unit with a polished finish. The exhaust cam opens and closes the valve just enough to do the job (all you need) but the inlet cam is a chubby little fellow with lots of dwell to hold the inlet valve open long enough for a super fuel charge. One point that is not realised by a lot of modellers is the importance of the exhaust cam shape in relation to the noise of the engine. If the lift is too rapid the exhaust valve opens rapidly and the note is quite sharp. The gentle curve on the lift side of the cam is responsible for the quiet running we find in the .70 Surpass. The cam followers are finished so fine that they look like they are chromed. Crankshaft machined surfaces are as the cam followers, and the counterweight is substantial to minimise vibration. The prop driver is keyed to the shaft with a Woodruff key (like a tall D) and the driver is marked with a cross to indicate top dead centre. The shaft thread is 5/16 inch x 24 TPI (UNF) and is fitted with a main nut and locknut which has a tapered, split collet that locks in the main nut. No lost props with this unit if the engine backfires.



OS 70 inlet valve. Long recess on valve stem is for split collets, a departure from C circlips on other models. Change is to accommodate higher power output.

Fuel Up

The induction tube has an oval shaped outlet which, combined with the inlet of the head, gives a very smooth fuel passage with no corners. Carby is simple to adjust with a rather stubby needle, fine thread and O ring seal. In spite of the stubby needle the tuning range was quite broad, even on synthetic oil fuels. The idle mix is pre-set, but minor adjustments are made with a secondary adjustment in the form of a slotted screw inset into the throttle arm hub. Throttle arm adjustment is by loosening a grubscrew in the hub (Allen key supplied). The carby can be rotated 180° to put the needle on whichever side of the model suits your purpose. Neat idea! A spring loaded choke is fitted to the carby mount



Magnificent engineering on the crankshaft. Large cut-away on crankweb for balance, large main bearing, lock nut for retention of propeller has split collet feature.

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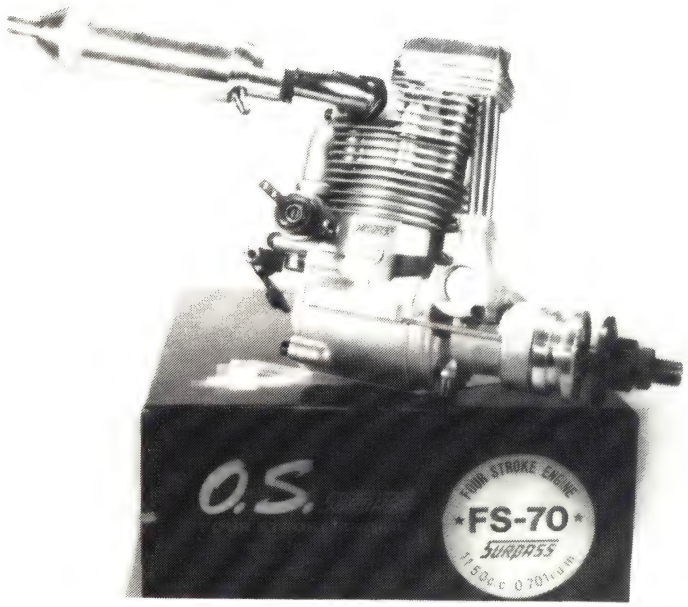
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The OS 70 Surpass. A 4-stroke, of course. A big, powerful engine, in a class of its own.



and an extension bar is supplied for this unit. Mr. OS must have been reading about my dreaded 'silicone crescent' (and dog hairs) in the fuel chamber of carburettors, as there is a section in the instructions warning of this problem and how to rectify it. NOW do you believe me?

4 U 2 Read

I strongly urge you, just this once at least, to read the instruction sheet supplied with the engine. It has been upgraded considerably, and contains some excellent information, not only for this engine, but for the operation of all four-strokes; their care and maintenance. Why not read it? After all, you ARE paying for it.

Summing Up

As this engine is not applicable to any specific competition, I think OS have produced it just to show how well they can manufacture a quiet, tractable, powerful 4-stroke that, due to the range of props it will spin, is equally suitable for zesty sport flying, scale work or mid size aerobatic models. A very pleasant engine that can't fail to please even the most discerning modeller.

Prop Test Results

11 x 7	Topflite Super M broad blade	11,000
12 x 8	Topflite Power prop	9,500
12 x 11 ★	Kavan glass	8,600
13 x 7	MK glass	8,500
13 x 8	Master	8,000
14 x 10 ★	Zarp wood (very broad blade	6,000
16 x 6	Master	6,250
16 x 7	Master antique	5,750
16 x 8	Zarp (as above)	5,500

Idle quite happy at 2,000 rpm

(★ indicates noteworthy result.)

Fuel for prop test was Magnum standard 4-stroke mix. Similar results were obtained with home brew synthetic oil mix.

Engine for test supplied by The Farnan Boys of Model Engine (Aust.), 57 Crown St., Richmond Victoria, 3121.



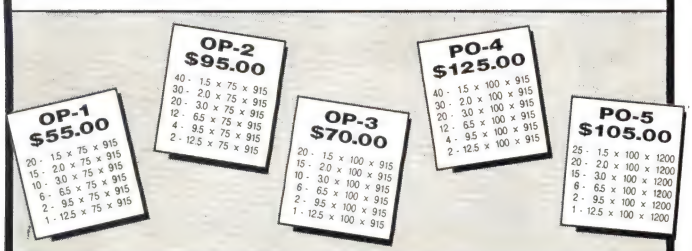
AT LAST I KNOW

..... what UFO stands for! Progress in chemistry has produced a glue that should still be popular beyond 2000 AD. The new Hot Stuff UFO does not give off fumes, it bonds quite quickly, and it is safe on styrene foam. It grabs fingers like the others, but then, it is supposed to be user friendly! Thick or thin, it is good stuff. Thanks to the Hunter boys for this one.

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Das Middle Stik:Shoulder wing; trike; for .25 to .30 engine and 4 channel radio **$12.00**

Das Mini Stik: Shoulder wing; trike; for .15 to .20 engine and 4 channel radio **$8.00**

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Guppy: High wing; TD; span 1340 mm; for .30 to .35 engine and 3 channel radio **$16.00**

Honker Bipe: Biplane; TD; 920 mmm span; for .09 to .25 engine and 3 or 4 channel radio **$8.00**

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Strike Master: Jet fighter lines; high wing; trike; 1365 mm span; for .40 engine and 4 channel radio **$14.00**

Swiftee Too: Low or shoulder foam wing; TD; 1220 mm span; .40 engine and 4 channel radio **$12.00**

Tarqueen: by Merv Buckmaster; Powered glider; 2310 mm span; for .09 to .25 engine and 2 or 3 channel radio **$11.00**

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F 400: High wing; trike; 1500 mm span; for .40 to .50 engine and 4 channel radio **$12.00**

Furfy Trainer: Span 1380 mm; for .19 to .40 engine and 4 channel radio **$12.00**

Gatsby: by Alan Lehmann. Sport bi-plane; span 1 metre, for .15 to .21 engine and 3 channel radio **$13.00**

Hot Drop 2: High wing; TD; ideal first model; span 1320 mm; for .15 to .25 engine; 3 functions **$13.00**

MCA: by Vin Masters. Span 1600 mm; for .29 to .49 engine and 4 channel radio **$14.00**

MiniDrake: by Celestino Rossi. 1600 mm span pusher; for .049 engine and 2 channel radio **$12.00**

Miss Muffet: by Paul Lagan. Aerobatic trainer; span 1300 mm; for .25 to .40 engine; 3 or 4 channel radio **$12.00**

Parakeet: by Russ Hammond. Span 1300 mm; for .15 engine and 2 or 3 channel radio **$12.00**

P-Ship: by Merv Buckmaster. 3-piece wing for choice of 1200 or 1800 mm span; for .15 to .29 engine and 3 channel radio **$13.00**

40/60 Trainer: High wing; trike; 1485 mm span; for .40 engine and 4 channel radio **$12.00**

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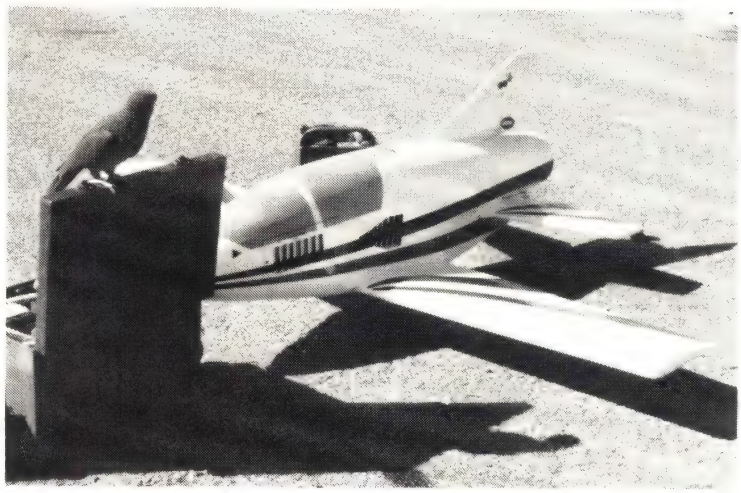
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FANTAILS

by Russell Weir



Tom Cook with his Starfire at Fort Worth DF fly-in. Well known for his Phantoms and use of Dynamax fans. Pic by R.W.



A real bird wonders about the strange intruders in the air at the Fort Worth "88 Fan Fly. Green parrot would not look at the Weir camera. BD5 is powered by an OPS, not bird seed!

EXHAUST DUCTING

The air exitting the fan is directed out the rear end of the aircraft via a tailpipe or exhaust duct. The diameter of this ducting is determined by the size of the fan being used. As with inlet ducting, there are many theories about the size needed for the exhaust duct. For the average sport model it is best if the area of the exhaust is the same as the swept area of the fan; i.e. the total area of the fan minus the area of the hub-spinner. This translates into a tailpipe diameter of about 90% of the fan diameter. If using a fan of 128 mm diameter, the exhaust pipe diameter should be 115 mm. A duct with these dimensions would be termed a 'Zero Contraction Tailpipe' (apart from any fuel tanks or tuned pipes that may occupy area within it).

Unfortunately, a tailpipe with these dimensions results in a fairly bulky-looking model. To design a scale model using these dimensions would result in an oversize model for the available thrust. A Zero Contraction Tailpipe allows the use of engines of lower power, in the 18,000 to 20,000 rpm range, as there is less restriction on the air leaving the fan. Couple these factors with a model in the 3 kg weight range and a successful sport model with average performance is possible, depending, of course, on other factors such as wing area.

A tailpipe that is contracted to an exit that has an area smaller than the fan swept area is possible, if an engine of higher power and rpm is available. We are talking here of 20,000 to 24,000 rpm. Under these conditions it is possible to contract the tailpipe exit to about 75 to 80% of fan diameter and still obtain sufficient thrust to fly a model in the 4 kg weight range. This will allow for a scale model of reasonable size featuring retract landing gear. The figures quoted all apply to typical 6.5 to 7.5 cc powered models.

As with all areas of technical endeavour, including model aircraft construction, designs may vary to a great extent and still be successful, so the preceding informaton should be considered as a guide and starting point only.

TAILPIPE LENGTH

This is important, as more drag can be expected with a longer duct. The tailpipe should be kept as short as possible. In practice this will depend on the overall shape of the aircraft. However, it is possible to provide a duct of shorter length by locating the fan as far to the rear of the plane as possible. The location of the fan, though, will depend on the centre of gravity requirements. The fan and engine is the heaviest single hardware component, and will most likely be located very close to the C of G.

Another way to provide a shorter exhaust duct is to design the model, if non-scale, with a boom type tail, as featured on the Phantom, Jaguar and several trainer type jets. The problem here is to ensure that the tail is strong and stiff enough. My current sport model under construction has a boom type tail, resulting in an exhaust duct of 400 mm. This is considered to be relativbely short. Anything over 600 mm for a 6.5 cc aircraft is considered to be getting rather long.

DUCT STRUCTURE

The material from which the duct is made depends mainly on the overall structure of the model. If the model has a fibreglass fuselage with no internal bulkheads or formers, it may be best to roll a tube of thin fibreglass sheet or commercial fibreglass material. This can be supported on the fan shroud at the forward end, and located within the fuselage at the rear end. The fan-engine exhaust duct system on a fibreglass model can often be built as a complete unit on the bench and fitted to the aircraft as a single assembly, as in the case of Mirage and Skyhawk

Fig. 1: Nose Intake

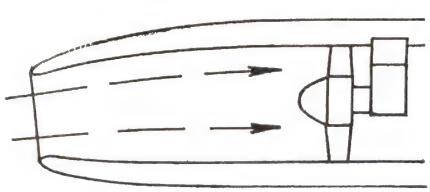


Fig. 2: Bi-furcated inlet; plan view

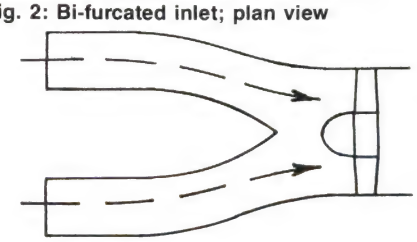


Fig. 3: Bifurcated improved; spinner shroud

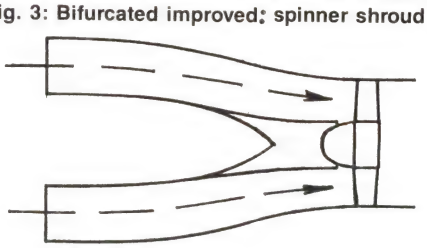
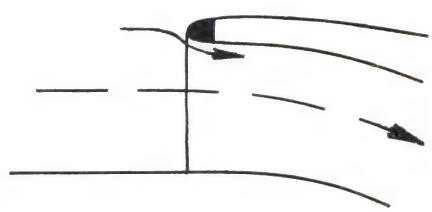


Fig. 4: Rounded inlet leading edge



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type models that have a large open area under the fuselage where the wing is located. Remember, the top of the duct must provide a hard point on which to secure the tuned pipe.

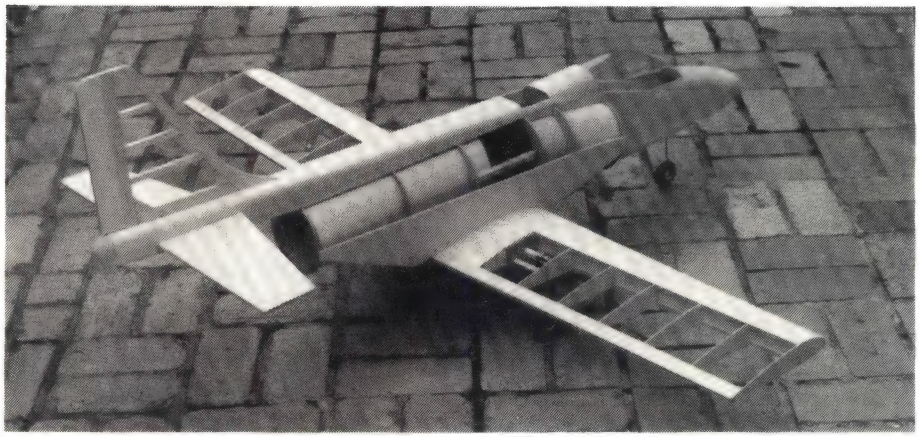
A model of all wood construction presents other problems, and the exhaust duct will probably be built as part of the structure of the model, supplying extra stiffness to the fuselage. I like to provide the fuselage with several plywood formers. Weight is not a worry, as most of the wood is cut away; remember, a ducted fan model is quite hollow. The exhaust duct can be of 1.5 mm balsa glued permanently in place. This is more than adequate in the strength department, and weighs a lot less than plywood ducting. Balsa ducting should be covered with dope and tissue. Lengthwise strips of tissue are the easiest to apply (another good reason for keeping the duct short). Cartridge paper can be used if ultra-weight-saving is the goal.

Finish with two or three coats of thinned enamel brushed on to give a shiny, smooth surface. The colour of the duct can match the outside surface of the plane. Lightly sand the duct between coats of paint, and remember that the duct is at the rear of the aircraft, so any excess weight will tend to cause tail heaviness. The forward end of the exhaust duct should mate smoothly with the rear edge of the ducted fan unit.

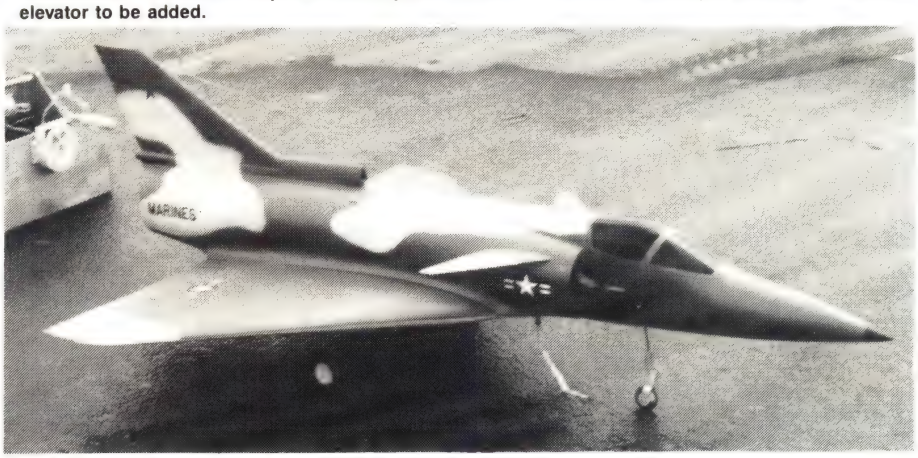
A ducted fan unit must be removable, and this creates problems in matching the fan unit to the aircraft exhaust ducting. The only way to allow for removal and installation of the duct unit is to provide a removable section of the duct in front of or to the rear of the fan unit. This must be close-fitting, with minimum air losses at the edges, and it should also be smoothly faired with the inside of the duct, to minimise airflow disruption.

If the engine mount and stators are built as part of the model, which, in fact, is a lighter and less expensive way to build an aircraft, a hatch still has to be provided in the engine area for access to engine throttle controls, fuel lines and tuned pipe.

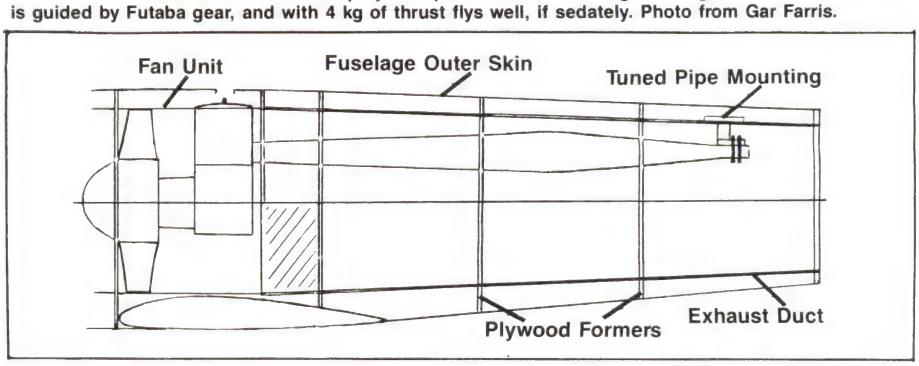
From the foregoing it is obvious that there are many requirements in providing just a simple tube, and each item requires careful attention if the model is to be successful.



Russell Weir's Jetster developed for 6.5 cc power. An all wood model with simple lines. Ailerons and elevator to be added.

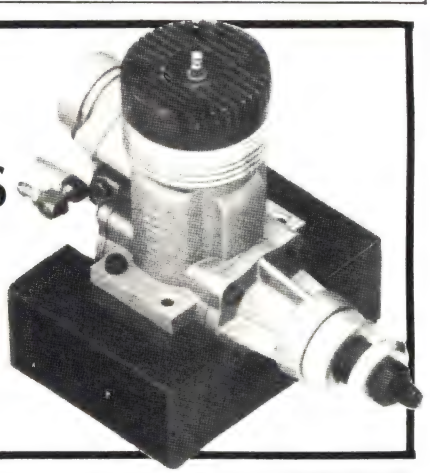


Seen at the Amberley Fan Fly back in March, Geoff McCarthy's Kfir, adapted from a Jet Hangar Hobby kit, powered by a K&B 7.5 with Turbax 1 fan shroud and cut-down Micromould impeller. The green and sand colour scheme is done in Pactra polyester paint. The model weighs 4.5 kg, has Rhom retracts, is guided by Futaba gear, and with 4 kg of thrust flys well, if sedately. Photo from Gar Farris.



Typical Ducted Fan layout as fitted to an all-wood built-up model. Cross-hatched area is a removable section of duct.

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by Phil Stevenson



Our FOCUS columnist's first venture into electric flying machines. Converted slope soarer is heavy, but flys satisfactorily with a 19 turn motor and 6 x 1200 mAh cells.



Mike Farnan with Pilot QB15H on EZ floats, all powered by a geared Mabuchi 540 motor on 6 cells. Test pilot was Farnan senior, who found that off-the-water flying at the MARCS lake, behind Mike, needed a bit of concentration. Model Engines photo.

After last issue's extravaganza on RTFs and Rallies, this time I'd like to get back to a few technological basics. It's one thing to describe what you can buy off the shelf, but a lot of people interested in electric flying are the more traditional, build-it-yourself type. Both groups of people benefit from a good, broad knowledge of their chosen hobby, and I get a lot of questions about what seems to me to be very basic ideas. So, let's start again and re-cover some of the ground that I've left alone for a year or so.

RETURN TO THEORY

Batteries

Here we are, of course, talking about nickel cadmium, re-chargeable cells. These nominally have a 'voltage' of 1.2 Volts, and come in varying sizes, usually measured in 'milli Amp hours' or 'Amp hours'. We join our nicad cells end to end, called 'in series', to increase the 'voltage' or 'potential' of the battery pack. The most common pack is 6 cells or 6 x 1.2 V = 7.2 Volts potential, and usually 1200 milli Amp hours capacity (or 1.2 Amp hours). The cell capacity in Amp hours is equivalent to the amount of fuel in our tank, and for convenience we can multiply the Amp hours by sixty and get Amp minutes; hence, 1.2 Amp hour = *72 Amp minutes.*

The rate that we use that fuel is the 'current' or flow of electricity (or electrons), and is measured in 'Amps' or 'Amperes'.

Power

The power we put into an electric motor is measured in 'Watts', and is equal to the potential multipled by the current; or Volts x Amps. We can use a simple analogy for Volts x Amps. Think of a tank of water holding 72 litres of water. It it had a potential of 7.2 cm it would be 7.2 cm high. At the bottom is a small tap. By opening the tap a small amount we can drain out, say, one litre per minute, and the tank will empty in 72 minutes. If we use that flow of 1 litre per minute to turn a paddle wheel it will not go round very fast or do much work for us. However, if we open the tap to drain at 10 litres per minute, the tank will empty in 7.2 minutes and the paddle wheel will go much faster and be more useful.

Now read that paragraph again, replacing 72 litres with 72 Amp minutes of battery capacity, 7.2 cm with 7.2 Volts, and 1 litre per minute and 10 litres per minute with 1 Amp per minute and 10 Amps per minute, respectively.

So, we can use our battery very slowly and receive very little power for a long time, or very quickly and receive lots of power for a short time, or anywhere in between.

As an extension of this idea, if we had the same tank of 72 Amp minutes capacity but 8.4 Volts (7 cells in series) or higher, then opening the tap by the same amount would give a greater flow, and our battery would drain more quickly, and yield more power for that shorter time.

Hence, if we replace a 6 cell battery with a 7 cell battery without changing the load (read motor and propeller) we have increased not only the potential but also the current, and hence have significantly increased the power. (Remember, Power = *Volts x Amps.)*

Practical Limits

This cannot go on forever because the motors, switches and cables that most of us use are based on the 1/10 scale RC buggy industry. These motors are relatively small, with iron magnets and small 3 pole armitures. The conductive parts of the motor, the brushes and the commutator, are fairly small, and have an effective, useful current limit of 30 Amps, without becoming very hot, causing excessive wear and probably magnet degradation and other damage.

At 30 Amps our 1.2 AmpHr (72 Amp minute) battery will last 72 ÷ 30 = 2.4 minutes, but if you run one of these motors for that long at 30 Amps you will damage it. If you want to give a competition 7 cell glider a fast launch, OK; 30 Amps for up to a minute maybe, but don't expect the motor to last forever!

The more normal use for these motors is for fun flying where a longer motor run is more desirable, at less power. At fifteen Amps the 72 Amp minutes will last 72/15 = *4.8 minutes.*

Amp Meter

I've been quoting current figures and, unless you have a good 0 to 30 DC Amp meter,it will all seem a bit remote to you. I bought my first such meter very early in my electric flying career and use it every week. I always check every new combination of motor-propeller-battery to ensure that I am not overloading my gear. If you intend to fly electric, and want to experiment a bit, an Amp meter is mandatory. A 0 to 30 ammeter is a bit rare in the electronics shops, but Moore Park Model Supplies have the Davey Systems unit at about $45. That is cheaper than damaging your expensive equipment.

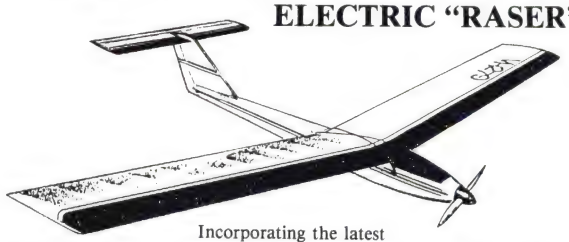
You may have heard claims of current capcity for motors and controllers in the hundreds of Amps. If they originated in the RC car area be dubious, because it is obviously impossible to measure the real load or current from a car in motion. It is, however, simple to measure the load of a motor and propeller in the air, and the highest that I have known is about 80 Amps. That was no buggy motor though, but a World Champs Standard F3E motor weighing 900 gram and powered by 29 cells. The connecting cables



Ces Anderson with a pair od electric powered Tiggies. Free flight models with VL units; one uses the battery from a polaroid film cartridge. At Nowra. PS pic.

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were enormous, and the purpose-designed speed controller cost about $500!

My point is that claims of anything more than 30 Amps for any motor or switch, or speed controller which does not cost more than $200, is nonsense. For speed controllers the claim is usually erroniously derived from the total rating of the component transistors without regard to the system driving them, which limits their effective capacity.

But that is getting off the track. Once you have your ammeter you can adjust the demand of your motor on the battery by changing the propeller. This is also the cheapest and easiest part to change. Remember that the larger propeller will spin more slowly but demand more power and probably yield more thrust. For normal buggy sized motors the variation in windings requires similar variations in prop sizes. For really hot wind motors, like the new Kyosho AP36, the maximum prop size for a nominal 20 Amp limit is probably less than a 7 x 6 (they even use the inch sizes for propellers in Europe!). But the sturdy 360 ST can swing a 9 x 6 with 6 cells, without hassles.

Basically, small iron magnet motors like to spin quickly. They run more efficiently that way, and last longer, so you should start with the smaller props, say 7 x 4, and if that does not provide enough power, go up in small steps until the current reaches a maximum of, say, 20 Amps, or until your power needs are satisfied.

Switches

Although there are several models and kits sold which are designed for use with 2 channel radios, I strongly recommend that everyone, **especially beginners,** have some means of switching off the flight motor from the transmitter. I will go through the options.

The worst system is the switch on and throw, which just lets the cells run flat, with ever-diminishing power, and the danger of damaging the poorer cells in the battery pack. Upon landing there is also the danger of damaging the motor or blowing a fuse if you cannot get to the model in time, as the prop is inevitably stalled, by a nose over or by being caught in the grass.

Next in line comes the types which are again turn on and throw, but have a cut-out system which prevents the cells from running down too far, usually to save some power to run the RC system. These allow you to land the model with the motor off, once the cut-out has operated.

Both these systems, however, cannot cope with a need to terminate the flight, or climb, prematurely if the model is getting too high, or if it is starting to rain, or for some more obscure reason such as if someone is breaking into your car. Also, as most beginners soon find out, their first flights rarely last long enough for the cells to loose much power, and inevitably end long way from the pilot, resulting in a rush down the field to turn off the motor, which is usually futile, as the motor or fuse has already burnt out.

The next rung on the ladder is a servo powered micro switch. If you have a 3rd channel and a spare servo this is easy. A cheap 10 Amp rated micro switch from your local Tandy, Dick Smith or equivalent store and you are in business. It's a bit bulky though, and you must be careful that the wires do not foul the switch movement, but this system has satisfied hundreds of modellers worldwide. It can also be added to the second, cut-out system if you wish.

For those without a third channel there are still two more choices. One is to use the extremes of the elevator control servo to switch a toggle switch. This works all right for a slow, stable model, but can cause control problems in difficult situations close to the ground. The other is a special electronic switch designed by Keith Emery in Melbourne which is an add-on to most 2 channel sets. (For more details phone Keith on (03) 467 5973; or see his ads in Airborne about a year ago.) These units have not been as popular as they should have been. Perhaps people do not want to modify their magic box of tricks. I've been using one for a year now and consider the design to be well proven and worthy of your consideration.

Relay Switches

Rising up the scale further, the next step is a simple on-off relay switch. Commercial units have been available from Astro, Multiplex and STW for some time, although I think only the latter is now sold here. These are lighter and much more compact than the servo-micro switch option. The cost, about $75, is less than a micro servo and switch of comparable size and weight. There are a few circuits around for the electronically inclined to make their own, and you can also use the servo amplifier from an old servo to switch a relay if you have such a spare in your junk box.

Controllers

The last step is a fully proportional speed (or current) controller. These allow full throttle control from the transmitter. Prices range from about $70 to $600, but for the practical 20 Amp limit of sport flying with a small buggy size motor, a maximum of $150 is reasonable. The European designs use a high frequency pulse of varying widths to control the power to the motor. Asian and some US designs tend to use the lower frequency of 50 Hz employed in the RC equipment, which the Europeans believe is less efficient and could be damaging to the motors. Most car controllers and their aircraft derivatives are 50 Hz, and their users don't believe the European ideas. The choice is yours.

Most of the Asian units are aimed at smaller aircraft using 6 to 8 cells. These usually employ a BEC (Battery Eliminator Circuitry) facility to allow the RC to function from the same battery as the motor. For aircraft, though, you also need a motor cut-out to prevent the cells from going so flat that the RC does not work, so make sure that you are not buying a car BEC unit.

B.E.C.s

The potential problem with BECs, in either controllers or in the cut-out switches, is that any loose connections in the system results in no radio control of anything! Considering that we need to remove the battery pack to recharge for each flight, the potential for inadvertant damage is increased, over the separate RC battery, so be careful.

My personal decision is to limit the use of BEC type switches and controllers to small models of up to about 600 grams, hoping that any such failure would not endanger people or property as much as a heavier unguided model would do.

Next issue I'll continue this introductory section by discussing charging and chargers.

BLERIOT

Now for something completely different. Because of the atrocious weather on the east coast for the first six months of this year, it's been a building rather than a flying time. In September, about the time this issue is due, UMAC will be running their second annual indoor RC event. Some might remember that I was fortunate to win last year's event with a somewhat rudimentary model of about 1.8 metres and 500 grams. I reported at the time that this was a big model for the space available, so I planned a smaller one for this year. I also wanted an extra challenge and decided on a scale model. Hence the Bleriot in the photos. The span is about 1.2 metres, and total mass only a shade under 400 gram (4 oz), resulting in a similar wing loading to last year's effort. Initial flights with a Kyosho 20 BB motorbike motor and 5 Sanyo 270 mAHr cells indicated

a need for more power. The installation of a slightly bigger Union (Sagami) 280 sized motor and 5 x 450 cells, plus a slightly improved prop, proved to be much more successful. RC gear includes two miniature Tartan servos, a small 7 channel RC and a BEC relay switch.

All the structure is balsa, including laminated fuselage longerons, tip outlines and wheels. Covering is the relatively new British film product, Lite Spane, which is held on with Coverite Quick Stick, as that was what I had. I was impressed with this covering combination. The fuselage bracing is sewing thread, including the wheel spokes. The wing rigging, requiring a little extra strength, is Kevlar bow (archery shop) string.

The original power cells were disguised as the rotary engine cylinder heads, but these have been replaced now with dummies. I've not managed to make the cylinders spin with the prop, however. Between the cylinders is the motor, which is geared about 4:1 to swing a scale-like balsa prop. The undercarriage is fully functional with castering wheels and bungy (hat elastic) springing.

The model was built from a three-view published in Airborne in 1985, and drawn by Frank Curzon. I gained some extra details from the Bleriot exhibited in Sydney's Powerhouse Museum, where you can take photos only after asking permission. I tried to duplicate every piece of wood, and intentionally deleted just two of the six wing spars.

Flying is obviously slow, but I was very impressed with the stability. Flown for the first time outside on what seemed like a calm day, it was bounced about by very gentle gusts without upsetting its attitude or control. The initial flight was with only 5 cells and the motor drained only 4 Amps. It is a lot of model to fly (but not climb) on only 20 watts input. The re-motoring almost doubled the current draw, and now flying is a dream, both inside and outside. Manoeuverability is excellent, with turns being much more precise and predictable than with last year's effort. I must now work on duration.

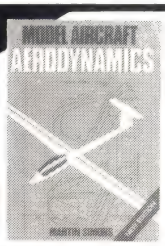


The columnist's Bleriot. There is another in FF Topics. This one is about 1 metre wingspan. It has to be electric! Plenty of wing area. All moving fin but tailplane with elevators; something ancient and something modern. PS photo.



Tony Vella with his Lion Mustang powered by Astro 40 Cobalt with gearbox and 21 cells. Massive for its size at 4 kg. A heavyweight! Definitely for the adventurous, both with the pocket book and with the flying. At Nowra '89. Photo by Phil.

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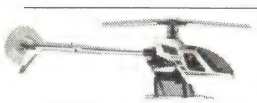


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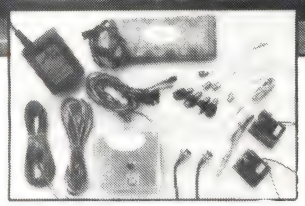
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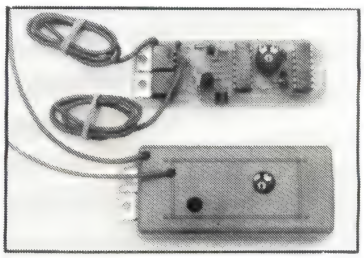
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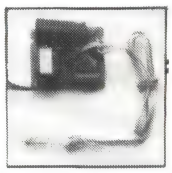
The Lighting Systems

The heart of the **Programmable Navigational Lighting System** (#180) is the unique Digital Controller, which turns all lights for wingtips, tail, landing and strobes on and off by remote control. There are no microswitches. The operational sequence requires only the setting of a small potentiometer to select the First Event "On Time"; all other events are automatic from then on. The system includes a 6v power supply so that no power is used from your airborne battery! The Digital Controller comes pre-wired except for the electrical connection to your radio system. Two digital switches control light timing selection, allowing you to select 2 modes of civilian blinking or military non-blinking modes. One system for all aircraft types — that's versatility! All components are available separately. See list at left. Also available is our new lightweight **Lighting System for Small Aircraft and Helicopters** (#188). It has all the best features of #180 in a lighter package. Our Single (#154), Dual (#155) and Triple (#156) **Synchronised Strobes** are real strobes, not just flashing lights, and are visible at long distances, even in sunlight. Each one weighs only 3 oz. #155 and #156 come with a charge adaptor resistor, microswitch, 3.6v battery and synchronising instructions.

In response to modellers' demands for even more versatility from our **Lighting Systems** (#180/188), we've developed a set of shaped, aerodynamic, clear **Plastic Lens Covers** (#189). Moulded of .030 clear ABS plastic, they are available in two each of six teardrop and round shapes in various handy sizes. They can easily be glued over both heat-shrink coverings and painted surfaces and can also be formed onto existing surfaces to enhance the appearance of your Lighting System-equipped model for that true scale look. These clear Plastic Lens Covers can also be readily coloured with commercial dyes for those applications requiring coloured lights.

#181 Digital Controller Only

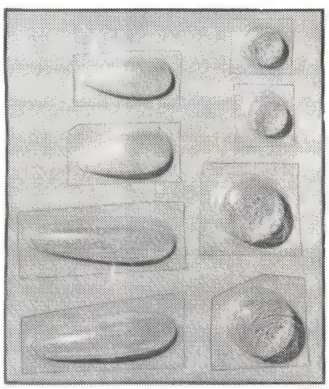
#182 6V 1300-1500 mAh Battery Pack



#183 6V 125 mAh Charger w/L.E.D.

#184 Navigational and Landing Light Kit

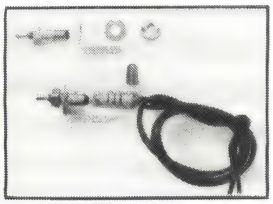
#155 Dual Synchronised Xenon Strobe Set



The Digital Power Switch

This **Digital Power Switch** (#166/167) is a replacement for a microswitch. The difference is that it works — reliably and consistently — flight after flight. Now you can set from 1-7 glow plugs to come on exactly when you want them to. Power is controlled from the receiver, not the throttle servo. The Digital Power Switch was designed to replace the balky, hard-to-set microswitches you have used up until now. Once it's installed, all you need to do is dial up to the point at which you want the plug or plugs to come on with help from the built-in L.E.D. That's all there is to it — just set it and forget it! Model #166 is for 1-4 plugs and model #167 is for 5-7 plugs.





The Charging Systems

The **12v Fast Charger** (#131) will charge McDaniel Starters in only 30-45 minutes. It plugs into your car's cigarette lighter and can do the job on the way to the field. The 12v Fast Charger is available as original equipment with all McDaniel Starters and as a separate accessory item.

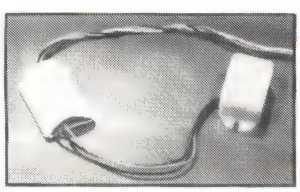
The **Field Trickle Charger** (#130) is specially designed to charge your McDaniel Starters from your field box 12v battery. For contest work — where you have to be sure that the power is there — or just a long day at the field, this charger is your insurance. Available only as a separate item.

The **12v Fast Charger for On-Board Ignition Batteries** (#) allows you to fast-charge your on-board glow-plug battery between flights. #134 will fast-charge your 1.2v single-cell Ni-Cad at 1.2 amp/hr, a 2v Gel Cell at 1.0 amp/hr and a 2.4v Ni-Cad at 1.0 amp/hr. Charge time of 45 minutes maximum is the recommended time for cells.



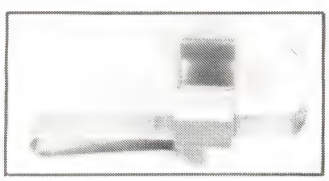
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The Sonic Alarm



The **Sonic Alarm** (#161) is a lightweight unit that will let you know if someone is on your frequency before you fly, help locate downed aircraft, range-check your radio and identify defective channels for encoders or decoders. Just add connectors and plug into an unused channel in your receiver. Current consumption is only 4mAh at idle.

The Belt Holder

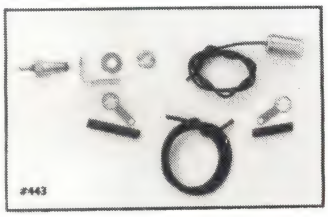


In response to requests from many modellers who like to carry their NI-STARTERS® to the flight line, this new **Belt Holder** (#901) will give you the added convenience of keeping the unit at your fingertips when only the quick, sure power of a NI-STARTER® will do the job.

The Aerial Advantage R/C Warranty

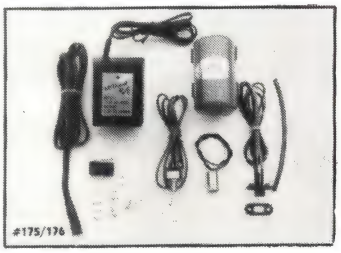
For 90 days from date of purchase, Aerial Advantage will repair or replace any product manufactured by them proven defective due to materials or workmanship. Where applicable, the warranty card must be on file. Any time after 90 days, a flat rate plus shipping and handling will be charged. For complete details see warranty attached to Aerial Advantage retail catalogue. (Warranty cards returned to Aerial Advantage)

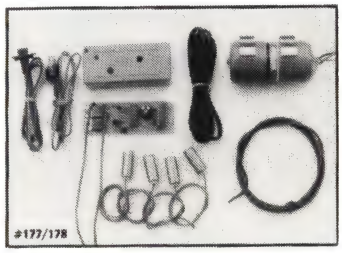




The Remote Glow Plug Adaptors

The **Remote PlugLock Adaptors** are the perfect solution for those forward-facing glow plugs, as well as for cowled engines where access to the plug is always a problem. The kits include everything you need and are available in single (#443) and twin (#444) versions for standard and Enya usage, and single (#442) and twin (#446) versions for OS, Saito and other deep-head uses. The Adaptors alone are available as #448 for standard and Enya usage and #449 for deep-head applications.

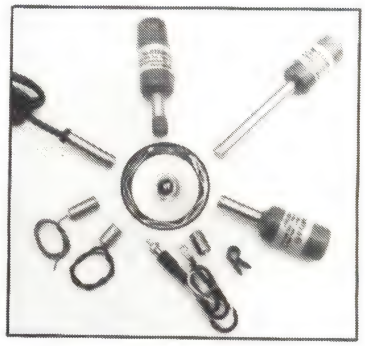




The On-Board Ignition Systems

The **On-Board Ignition Systems** (#175/176) allow you to drive your glow-plug(s) from the on-board battey or from your external power panel with the flip of a switch. You can now use your power panel for starting, engine break-in or warm-up, and then switch to "on-board" power for flying. There are two models: #175 weighs only 5 oz. and uses a 1.5 amp/hr "C" cell Ni-Cad. #176 is a heavy-duty 4 amp/hr "D" cell with an all-up weight of 8.5 oz. both systems can drive twin cylinders with the addition of a second glow-plug adaptor (not supplied). The system features our new Stainless Steel glow-plug-adapted head (#448), which fits all standard, Enya and most O.S. type plugs. A special O.S. Deep Head adaptor (#449 is available separately. The system comes with a charger, switches, wiring harness, standard plug adaptor, Ni-Cad battery with special holder, external charge/drive jack, 48" power panel adaptor lead and simple instructions. The **On-Board Ignition System w/Digital Power Switch** (#177/178) is a unique system for use with 4-cylinder engines using 1.5 volt plugs. (#179) is for use with 5-7 cylinder engines. They incorporate our new Digital Power Switch (#166) and a 2.5 amp (#177) or 5 amp (#178/179) 2v Gel Cell for on-board plug power along with our new Stainless steel **PlugLock**TM connectors. Everything you need is included, and the Digital Power Switch is factory-assembled (less radio connector). #177 weighs 9oz. and #178 weighs 16 oz. See #134 for fast charging!

Introducing PlugLock



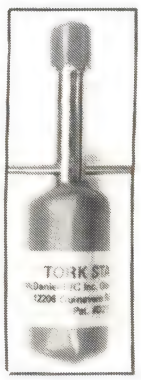
When the Ni-Starter® was introduced, it was a revolution in the easy, powerful starting of 1.5v glow-plug model engines. In just a few years, it has become a starting tool. It features heavy-duty, rechargeable Ni-Cad power to provide over 50 starts from one charge. And now we've even outdone ourselves by introducing the Ni-Starter® with **PlugLock**™. All **PlugLock**™ based products feature:

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- Units with chargers include a metal clip for holding your NI-STARTER® conveniently on your field box.
- High-visibility International Orange vinyl covers to defy loss and protect your battery and meter.
- A durable, shock-resistant Dual-Faced Amp Meter on the metered versions that also gives a positive visual indication of your plug's power consumption.

Compare! The new NI-STARTER® with **PlugLock**™ is not a kit! It's ready to charge and use, with more power and reliability than the 'copycats'.



The NI-STARTER® (#105) now features **Pluglock**™, which works either sideways, upright or inverted and fits easily through cowls. Your NI-STARTER® stays on the plug — not in the prop. The standard NI-STARTER® and an extended 2" version are available with a variety of chargers. The TORK STARTER™ (#122) was specially designed to allow you to loosen or tighten the plugs on those high-compression engines while applying all of the NI-STARTER'S® heavy duty starting power. It features a steel wrench with a T-handle for lots of torque. The rugged steel body won't strip out due to excessive pressure and its internal clip both ensures positive connections and allows it to be used either upright or sideways. The TORK-STARTER™ comes in a standard model as well as a 4½" version that will reach deep in cowls and water-jacketed heads. All models of the NI-STARTER® and TORK-STARTER™ are available in Metered versions that feature a Dual-Faced Amp Meter that's durable and shock-resistant.





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The Power Panel Adaptor Cord

The 48# **Pluglock**™ **Power Panel Adaptor Cord** (#147) is also available in an extended reach version (#148). Its Stainless Steel and Teflon construction is the same as is used in the new NI-STARTER® . The McDaniel **Pluglock**™ glow-plug adapters are available in two versions to fit all plugs. #448 is for standard and Enya engine applications, and #449 is an extended version specifially designed for O.S., Saito and other deep-head applications.

For Old Timer Sake

by Colin Borthwick

TO SPARK THINGS OFF

Over the years I am sure we have all wondered about the nomenclature used by the Spark Plug manufacturers in the '30s and '40s. Such companies as Champion, Auto-lite and AC produced a dazzling array of spark plugs with an equally dazzling coding system to identify them. Perhaps these charts will assist you.

SPARK PLUGS

Champion Spark Plugs

	V	V-2	V-3	VR-1	VR-2
Thread Size:	3/8 24	1/4 32	1/4 32	3/8 24	1/4 32
Hex Size:	1/2	3/8	5/16	1/2	3/8
Thread Length:	7/32	7/32	5/32	7/32	7/32
Weight:	8 gr.	3½ gr.	2½ gr.	9 gr.	4 gr.

AC Model Engine Spark Plugs

All the important dimensions and weights are shown in the table below. There are two plug types in each of the three sizes. One of these two is a hot plug (indicated by H following the type number) and the other is a cold plug (indicated by a C). The selection of the hot or cold type for each usage depends primarily on the characteristics of the engine, although the cold type is usually preferable when operating at maximum rpm, while the hot type is more adaptable to operation at lower rpm.

	2H	2C	3H	3C	4H	4C
Thread Size:	1/4 32	1/4 32	3/8 24	3/8 24	1/4 32	1/4 32
Hex Size:	3/8	3/8	1/2	1/2	5/16	5/16
Reach:	7/32	7/32	7/32	7/32	5/32	5/32
Weight:	3.59 gr.	3.65 gr.	8.40 gr.	8.57 gr.	2.95 gr.	3.00 gr.
Exposed Length:	23/32	23/32	27/32	27/32	5/8	5/8

Auto-Lite Spark Plugs

Auto-Lite miniature spark plugs have special alloy needle point electrodes which facilitate engine starting. The insulators are made of a superior aircraft grade ceramic insulating material. Leak-proof, one-piece shell construction permits expansion and contraction under varying thermal conditions. Centre seal is the cemented type with serrated centre electrode silver soldered to the terminal. It will not loosen with use.

	M1	M2	M3	M4	M5	M6
Thread Size:	3/8 24	3/8 24	3/8 24	1/4 32	1/4 32	1/4 32
Hex Size:	1/2	1/2	1/2	5/16	3/8	3/8
Thread Length:	7/32	7/32	7/32	5/32	7/32	7/32
Weight:	8.5 gr.	8.5 gr.	8.5 gr.	3.0 gr.	3.5 gr.	4.0

Sphinx Ignition Plugs

The Sphinx Gnat was claimed to be the smallest, lightest and most efficient miniature sparking plug, but no dimensions are available.



Spark plugs, vintage designs, for model engines, the original Brown Junior plug on the right. Colin has sent copies of diagrams giving plug dimensions, but they would not reproduce satisfactorily for the magazine. The tables of details should suffice. CB photo.



George Gill, an Aussie boomerang enthusiast, displays a tri foil design. At the Veterans' Gathering. At times it was the only thing that could be flown in the dismal conditions.

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ENGINE CHART FOR CHAMPION SPARK & GLOW PLUG SIZES

Make and Model	Plug Spark	Plug Glow
AERO MARINE; Dyna-Jet	V	VG-1
AIR-O-MIGHTY; Midget	V	VG-1
AJAX; ⅜ 24	V	VG-1
¼ 32	V-2	VG-2
ANCIL; Plane Engine	VR-1	VG-1
Car Engine	VR-2	VG-2
ANDERSON; Spitfire	V	VG-1
Baby Spitfire		VG-3
Royal Spitfire		VG-3
Spitsy		VG-3
ARDEN; All	V-3	VG-3
ARISTOCRAT	V	VG-1
ATOM	V-3	VG-3
ATOMIC	VR-2	VG-2
ATWOOD; Glo-Devil		VG-2
BALL	VR-2	VG-2
BANTAM	V-3	VG-3
BARKER; Man-ul-matic	V-2	VG-2
BELMONT	V	VG-1
BLUESTREAK	VR-2	VG-2
BOND; Special 4-cyl	VR-2	VG-2
Model A, 680 Sideport, 680 Rotary	V	VG-1
BRADLEY; Class C	V	VG-1
BROWN; Pioneer E	V-2	VG-2
B, BD, C, M, 13D	v	VG-1
BULLET	VR-2	VG-2
BUNGAY	VR-2	VG-2
BURGESS	V-3	VG-3
BUZZ	V-2	VG-2
CAMERON; .09 Race Car		
Models L, L-2, R		VG-2
.09 Aircraft		VG-3
.23 Aircraft	V-2	VG-2
CANNON	V-2	VG-2
CAMPUS	V-2	VG-2
CHAMPION; E	V-1	VG-1
J, JH	VR-2	VG-2
CHUM	V	VG-1
CIRCLE	V-2	VG-2
COBEY-WAITE; Cobra	V	VG-1
Scout Class A	V-2	VG-2
COMET	V-2	VG-2
CONDOR	V-2	VG-2
CONTESTER; ⅜ 24	V	VG-1
¼ 32	V-2	VG-2
CUB (See OK)		
DAVIES; Dwarf	V	VG-1
DeLONG; ⅜ 24	V	VG-1
¼ 32	V-2	VG-2
DEMCO; Fireball	V	VG-1
DENNYMITE	V	VG-1
DOOLING; 60, 61	VR-2	VG-2
All others	V-2	VG-2
DRAGON	V-2	VG-2
DYNAJET	VR-1	
ELF	V-3	VG-3
FEENEY; Model A	V	VG-1
Model C	V-2	VG-2
FLEETWIND	V-2	VG-2
FORSTER; .99, Super 99	V	VG-1
.31, .305, .29, .199	V-2	VG-2
FOX; 29	V-2	VG-2
.29 Racing	VR-2	VG-2
,35, .39 and all others		VG-2
G.H.Q.	V	VG-1
GENIE	V-2	VG-2
GLO-MITE		VG-2
GWIN-AERO	V	VG-1
HASSAD	VR-2	VG-2
HAYWARD-CONNELLY	VR-2	VG-2
HELM	V-3	VG-3
HERKIMER (See O.K.)		
HORNET; ⅜ 24	VR-1	VG-1
¼ 32	VR-2	VG-2
HURLEMAN	V	VG-1
HUSKY; JV	V-3	VG-3
Junior	V	VG-1
INTERNATIONAL; G-9,		
Pixie, Zephyr	V	VG-1
All others	V-2	VG-2
JUDCO;	V-2	VG-2
JUNIOR MOTORS; E	V-2	VG-2
B, C	V	VG-1
K&B; Torpedo		
.049, .19, 2.49, 2.99	V-3	VG-3
Glo-Torp		VG-2
KADET	V	VG-1
KEN	VR-2	VG-2
M&M	V	VG-1
McCOY; Racing Class C	VR-2	VG-2
Invader 45	VR-2	VG-2
Invader 30	V-2	VG-2
Red Head .09, .49, .60	VR-2	VG-2
Red Head .19, .29	V-3	VG-3
Sportsman Jnr. & Snr		VG-2
MADEWELL	V-2	VG-2
MAGEE	VR-1	VG-1
MARVIN; Class C	V	VG-1
Junior A, Senior A, Class A	V-3	VG-3
MEGOW	V-3	VG-3
MELCRAFT; 29	V-2	VG-2
Class C	VR-2	VG-2
MERCURY	V	VG-1
MERLIN	V-2	VG-2
M.E.W.; 307	V-3	
MICRO-DYNE	V-3	VG-3
MICRO-MOTOR	V-3	VG-3
MIGHTY MARINE & MIDGET	V	VG-1
MINIATURE; Bullet, Torpedo	VR-2	VG-2
MINIJET	V-3	VG-3
MOHAWK; Chief	V-2	VG-2
MOLNAR	V	VG-1
MONARCH	V-2	VG-2
MORTON; M5, M42	V-3	VG-3
Challenger	V	VG-1
O.K.; Twin 55	V	
Hothead, Mohawk, Chief	V-2	VG-2
Super 60, Super 60 Rating	V	VG-1
Bantam Cut .039, .049, .074, .099, .14		VG-3
Special, Deluxe	V	VG-1
Super .29, .49	V-2	VG-2
OHLSSON; Goldseal	V	VG-1
OHLSSON & RICE;		
60, ⅜ , 24	V	VG-1
60, ¼, 32	V-2	VG-2
19, 23, 29	V-2	VG-2
ORR; ⅜, 24	VR-1	VG-1
¼, 32	V-2	VG-2
ORWICK	V-2	VG-2
PACEMAKER	VR-2	VG-2
PEE WEE; (Marvin)	V-3	VG-3
PERKY	V-2	VG-2
PHANTOM	V-2	VG-2
PIERCE	V-2	VG-2
PRICE	V-2	VG-2
RACEWAY; Marine	V	VG-1
RAM	V-2	VG-2
RANGER	V-2	VG-2
R.B.; Special		VG-3
REBEL	V	VG-1
RECOR	V-2	VG-2
RIGHTER	V	VG-1
ROCKET	V-2	VG-2
ROGERS; 60	V	VG-1
29, KD 29, 35	V-2	VG-2
S.M.E.	V	VG-1
SCOUT; Twin	V-2	VG-2
SILVER KING; ⅜, 24	V	VG-1
¼, 32	V-3	VG-3
SKY CHIEF	V	VG-1
SKY DEVIL	VR-2	VG-2
SOUTHWEST AIRWAYS	V-2	VG-2
SPEEDWAY	V	VG-1
SPITFIRE (See Anderson)		
SPORTSMAN (See McCoy)		
STANDARD	VR-2	VG-2
SUPER CYCLONE;		
G Single Ignition	V	VG-1
G Dual Ignition	V-2	VG-2
GR Single Ignition	VR-1	VG-1
GR Dual Ignition	VR-2	VG-2
SYNCRO; Ace Special	V	VG-1
Bee, B-30, PC-2	V-2	VG-2
THOR	V-2	VG-2
TIGER AERO	V	VG-1
TOM THUMB	V	VG-1
TORPEDO (See K&B)		
TRIUMPH; 49, 51	VR-2	VG-2
TROJAN	V-2	VG-2
UTILITY; Cobra	V-3	VG-3
U, Cowboy, Scout, Pioneer	V	VG-1
Asp, Mongoose	V-2	VG-2
King Cobra	VR-1	VG-1
VIKING	V-2	VG-2
VIVELL		VG-2
WALKER	V	VG-1
WALLY MOTORS	V	VG-1
WARRIOR	V	VG-1
WASP; All models		VG-2
WEN-MAC		VG-3

FOR OLD TIMER SAKE

SERVICE NOTES

Cleaning

Champion V Spark Plugs may be cleaned by brushing the firing end with a fine bristle brush and Stoddard Solvent. DO NOT USE CARBON TETRACHLORIDE. Allow time for drying, or blow out the firing bore with an air blast.

Champion V Glow Plugs require no servicing or adjusting. Do not attempt to brush the firing end, as damage may occur to the THERM-O-FLEX element.

Gap Setting

Champion V Spark Plugs may require gap re-setting, and this should be accomplished by bending the ground electrode only. Do not attempt to bend the centre electrode, as damage to the insulator may occur.

Champion V Glow Plugs do not require adjustment.

Installation

Always use the proper size socket wrench to install or remove Champion V Plugs. Tighten firmly to prevent loosening and compression leakage between the plug and the cylinder head.

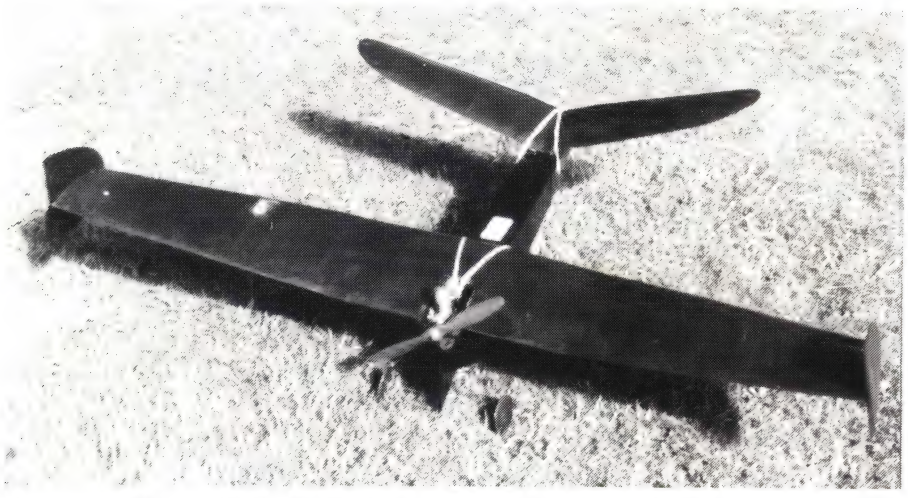
THE ASCENDER CANARD

by Jim Fullarton

This model first saw the light of day back in 1945, being inspired by the Miles Libellula, which was made during the war. In the original form it was a low-wing with an Ohlsson 23 motor, but due to lack of knowledge about how to locate the CG (which, incidentally, also applied to the Miles prototype, giving Mr. M. a nasty fright on his test flight), it proved to be so unstable that it could not even crash properly.

A few years later, as a result of an excellent article on aerodynamic centre location by Henry Cole, it started to perform, first with an ED Mk 2, and later with an ED Bee. A second place in the Unorthodox event at the 1950 Nationals led to the publication of the plans in the April 1951 Aeromodeller.

Since then it has been flown at odd times with other engines, such as an M.E. Heron and a Taipan 1.5, though this was a bit too powerful, leading to a crash which put it on the shelf some years ago. Last year I got around to restoring it, using a sharply dihedralled elevator to improve spiral stability, and it is now flying again with an Indian Mills .75. The one remaining vice is a Dutch Rolling tendency, probably due to too much dihedral in the main wing.



Jim Fullarton's Ascender FF canard, a strange but successful design, published in Aeromodeller July 1951, still flying after recent restoration, and now 44 years old! Are there any other old models out there?

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Leigh (Budge) Hawk and Ron Gladstone at Reservoir, Victoria, in the late 1940s. Spark ignition motors were both Marden 23s. Photo from Norm Bell.



Mark Collins relaxes between rounds with his Flamingo, at Canowindra '89. Photo from Norm Bell.



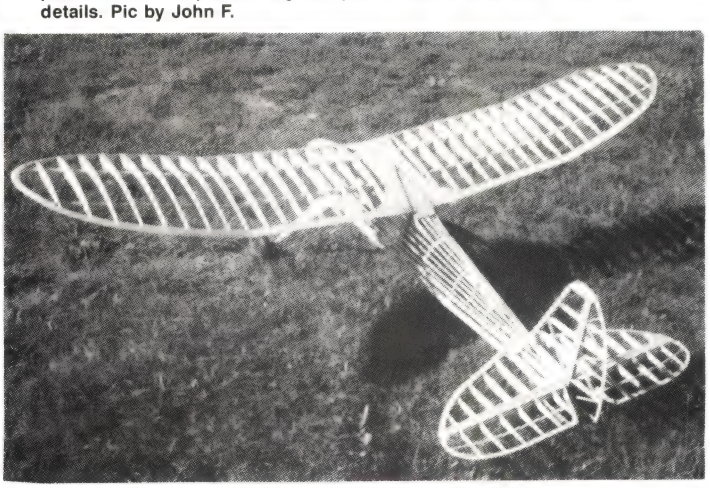
Bill Britchard with his 1.5 times 1942 Spectre by Gerry Broffman, which won the Old Timer event at the Noarlunga 4-Stroke Fun Fly last March. Photo from Tom Lloyd.



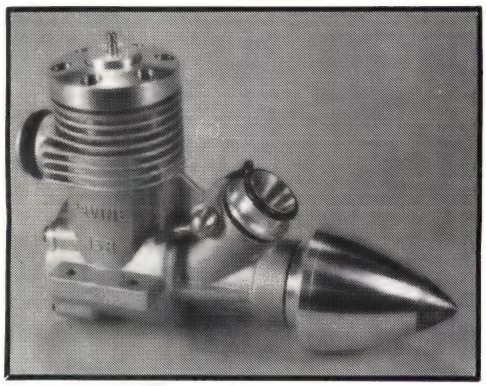
Nats ½A Texaco winner, Peter Werzcyck, with his MG built from the AIRBORNE plan. All our ½A plans are good, proven flyers. See the new plans list for details. Pic by John F.



Joe McGuffin gives his Dallaire an energy injection. Assistant is Harold Stevenson.



Framework of the Editor's HV450, a vintage power model by Henri Varache, from Aeromodeller April 1947. A view like this is part of the reward for the effort involved!



IRVINE 15R ABC SPEED

In October 1986, Peter Halman of IRVINE ENGINES broke the Russian-held 5 cc class FAI World CL speed record, not with a 5 cc engine, as one might expect, but with a slightly modified Irvine 21 of only 3.5 cc. Not content with resting on his laurels, Peter has developed the IRVINE 15R to have a crack at the premier FAI 2.5 cc CL speed class which has been dominated by hand-built special engines from the Soviet Union.

In June 1987, using a pre-production model of the Irvine 15R, Peter set a new British 2.5 cc class record of 284.81 kph (176.97 mph). At the 1988 CL World Championships in Kiev (Russia), Peter recorded 285.49 kph (177.39 mph) to achieve the highest speed of any competitor from the western world. In October the same year, Peter recorded a blistering speed of 288.92 kph (179.53 mph).

The IRVINE 15R is now in production, with two versions available. There is the 15R Normale for free flight and combat, and the 15R Speed, complete with the Irvine tuned pipe designed for it. Both these engines are available ex stock. Price for the 15R Normale is $256.20, and the 15R Speed with tuned pipe is $318.90.

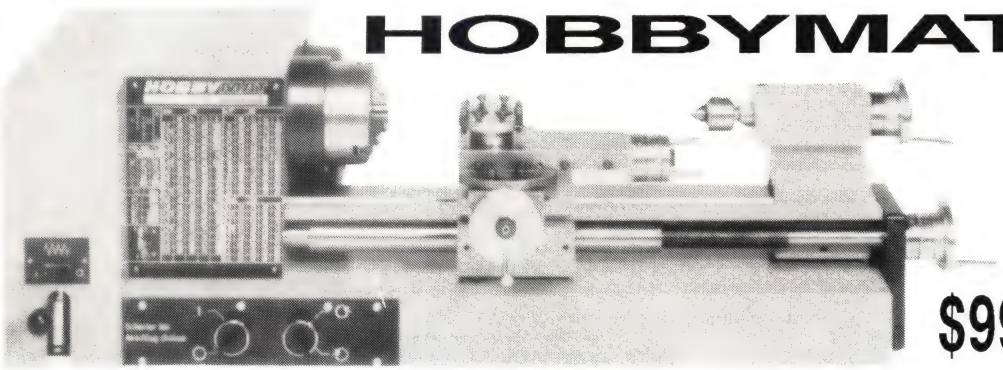
Successes with the Irvine 15R Speed have been reported from ROBIN HIERN, who recorded 37,800 rpm using his test prop on the bench (and the engine is not completely run-in yet, according to Robin). During the first test flight with his Irvine 15R he returned a speed of 250 kph plus, and this with the 15R straight out of the box with no mods whatsoever. One can understand Robin's excitement with the Irvine 15R. Here is an engine, at last, that will outclass the competition with very little effort. You guessed it, Robin bought another Irvine 15R Speed the same day.

IRVINE 15R ABC Normale	RE, FI
IRVINE 15R ABC Speed w/pipe	RE, FI
IRVINE 20 Stunt	SE, FI
IRVINE 20 BLACKHEAD Stunt	SE, FI
IRVINE 20 ABC Pylon	SE, FI
IRVINE 21R ABC Speed w/Spinner	RE, FI
IRVINE 25 Stunt	SE, FI
IRVINE 25 BLACKHEAD Stunt	SE, FI
IRVINE 30 Stunt	SE, FI
IRVINE 40 Stunt	SE, FI
IRVINE 40 Speed w/o muffler	SE, RD
IRVINE 20 R/C	SE, FI
IRVINE 20 BLACKHEAD R/C	SE, FI
IRVINE 20 ABC R/C	SE, FI
IRVINE 21R ABC R/C	RE, FI
IRVINE 25 R/C	SE, FI
IRVINE 25 BLACKHEAD R/C	SE,FI
IRVINE 25 Helicopter	SE, FI
IRVINE 30 R/C	SE, FI
IRVINE 40 R/C	SE, FI
IRVINE 40 Speed R/C	SE, RD
IRVINE 40R R/C	RE, FI
IRVINE 40 ABC R/C	SE, FI
IRVINE 61 R/C	SE, FI
IRVINE 61R R/C	RE, FI
IRVINE 61R R/C w/piped liner	RE, FI
IRVINE 61 ABC R/C	SE, FI
IRVINE 20 Marine	SE, FI
IRVINE 20 ABC Marine	SE, FI
IRVINE 21R ABC w/o Flywheel	RE, FI
IRVINE 25 Marine	SE, FI
IRVINE 40 Marine	SE, FI
IRVINE 40 ABC Marine	SE, FI
IRVINE 40R ABC Marine	RE, FI
IRVINE 40 ABC Marine	FE, FI
IRVINE 61 Marine	SE, FI
IRVINE 61R Marine	RE, FI
IRVINE 20 Car	SE, FI
IRVINE 20 ABC Car	SE, FI
IRVINE 21R ABC Car	RE, FI
IRVINE 21R ABC Car w/o carby	RE, FI
IRVINE 25 Car	SE, FI
IRVINE AE10 1.0 cc Diesel	
IRVINE AE15 1.5 cc Diesel	

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★3 jaw chuck ★rotating centre ★drill chuck ★chuck guard
★set of changewheels ★leadscrew clutch

Optional extra tooling which is available, includes vertical milling and drilling attachment, 4 jaw chuck and collet adaptor.

Brief Specification Centre Height 65mm, Distance between centres 300mm, Speed Range 250/500/1000/2000, Electrics 240v/50Hz single phase motor, ⅓HP., continuously rated 0.25kw

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PYLON ROUNDUP

by John Hughan



S.A. State Champs Sports Pylon placegetters.: L to R: Craig Jones, 1st, with Bolly Piel and Enya 45 CX; Barry Heard, 2nd; and Tom Lloyd, 3rd. Photo from Don Howie.



FAI trophy winners at the SA Pylon State Champs: David Garner (2nd); Brian Steele (1st); and Les Bollenhagen (3rd). Howie pic.

SUNNYSIDE, ALMOST

This year the Australian Miniature Pylon Racing Association (AMPRA) held their Championships at Cohuna, which is in Victoria, right next to the Murray River. They were held over the Queen's Birthday weekend, when many nearby sites, at which big competitions were held, experienced very heavy rains. The FF State Champs at Wangaratta, the Scale competition at Shepparton and the LSF at Jerilderie all had downpours, causing considerable loss of, time and generally spoiling the weekend. This can be heartbreaking, especially when you consider all the work that the club members put in to make the event possible.

AMPRA has been run for 13 years, at a number of sites, but mainly at Cohuna and Deniliquin, and during that period we have been fortunate to have never been rained out. This year was no exception. We lost about 5 minutes with a light shower on Saturday, which was also very cold. For the rest of the weekend it was about 18° and fine.

Some time ago someone wrote that AMPRA was a greedy rip-off organisation. I would like to take this opportunity to disclose what AMPRA is doing for pylon in particular, and aeromodelling in general, in Australia. The club that runs the AMPRA Championships, organises and finances everything. They supply the labour and the majority of the prizes. They obtain the help of the Victorian Miniature Pylon Racing Association (VMPRA) to get a loan of pylon equipment such as cages and 2-way radios. They pay for the petrol to get the equipment to the site. The club also runs the canteen. AMPRA accepts nothing from the AMPRA Championships. All profits from the canteen and all the entry money is retained by the host club. This adds up to a sizeable amount, as AMPRA had 92 entries this year.

You see, pylon is still growing. Pylon has been around for quite a long time, and through sound thinking, and the abilioty of the leading lights in the association to get on with each other (this means no arguments!) we have no break-away groups. Throughout the many years that I have been associated with aeromodelling I have seen many new classes take off like a rocket. Their initial competition days attract very large entries; everyone gets on the band-wagon; a committee is formed to promote the class. The next thing is that new, unpopular rules are introduced, and there is either a break-away group formed or the ordinary contestants find it too hard to compete against the hot shots, so they lose interest. A



Two-One-Three in ½A Pylon at the SA State Champs: David Garner and Lance Langham both used OS 10 FPs, while Brian Steele used a Super Tigre X11. Photo: D. Howie.



Welcome visitor to the Amberley Nats, Garry Gau, right, from Tonawanda, NY, USA. Flew in QM with Bruce de Chastel calling. Seen here with FAI Midget Mustang with ST 40 and Andy Kerr pipe.

couple of years later, after a brilliant start, you find that the number of entrants has decreased, and after a few more years there is only a handful left.

The pylon people generally do things right - they get on well together. They discuss problems in a rational way and agree on a solution. Who else in aeromodelling in Australia is getting 92 entries? - No-one! There is a further light on the horizon for pylon. ½A, through the new rules of the larger course and the increase in engine size, is now increasing in popularity. QM, with the new engine size, is regaining interest. Next year we should crack the 100 entry mark at the AMPRA Champs!

With the money from large entries that the host clubs earn from the AMPRA Champs they make improvements to their fields, such as club sheds and sprinkler systems. The more money that the clubs make the happier AMPRA is: after all, they do the work - they reap the rewards.

I would like to thank the sponsors of AMPRA for their assistance in making the event possible. In particular to Magnum Fuel for supplying all the fuel for all the events. Naturally, no complaints from any of the competitors. The other sponsors were: Taylor Made Fodder Equipment; Model Engines, Airborne Magazine; VMPRA; Full Ahead; Bolly Props; Orchards Hobbies; Bryzen Hobbies; Avionics; and Tates Hobbies. There was also a sizeable number of local businesses who gave cash donations for the running of the Champs.

THE RACES

The AMPRA Champs are run to a set schedule of events. The large number of entries will necessitate a change in the schedule for next year. I will let you know about this when things have been finalsed; however, all the events will be run, but in different time slots.

This year Formula S and QM were run on the Saturday. That night we conducted our AGM and were treated to a magnificent buffet meal provided by the members' wives. On Sunday QM was finished off, followed by FAI. On Sunday night we went to the Barham Services Club for a nice meal and chin-wag, followed by some losses on the pokies. Monday morning FAI was finished, followed by ½A. Presentations were then made to the winners.



Roger Langham won QM at the SA pylon State Champs. Photographer Howie reports that these models are getting larger to accommodate the 3.5 cc engines. Surely it can't be called Quarter Midget any more?

At the AGM certain items came up that need to be disclosed:

1. There has been no news of what is being proposed Internationally in regard to noise levels. This is still in the hands of the Technical Sub-Committee; chairman Bob Brown (USA).
2. Tim Haynes was given a vote of thanks for the work he has put into pylon over the last few years in NSW.
3. In QM the 21 size engine is now legal, nationally.
4. Work is proceeding with the National Standardisation of the Formula S rules.
5. South Australia and Queensland now have pylon equipment along the same lines as Victoria.
6. Bruce and Ron de Chastel are promoting pylon in Queensland.
7. Next AMPRA Champs will be at Deniliquin (1990 Queen's Birthday weekend).
8. The minimum weight for QM is still 2½ lb (1.132 kg).

Results Formula S

Steve Rothwell (NSW) had a clear-cut win in this event, flying a Little Toni (FAI) model powered by a Rossi 40. Best time was 1:46.5, by Steve. Second was a very popular placing by Brendan Taylor who flys Formula S very well. Brendan hails from Cohuna. He flew a model designed by Robert Taylor powered by an OS 45. Third was John Wenbourne (NSW), also flying a Little Toni, fitted with a trike undercart.

1.	Steve Rothwell	444.10
2.	Brendan Taylor	369.33
3.	John Wenbourne	308.14
4.	Ray Hicks	283.30

Results Quarter Midget

Bernard McKay (Tas) had the fastest QM that I have ever seen: Rossi 21 with special Nelson head and Folkerts aircraft. Unfortunately the model was sufferning from control surface flutter and the CD, Steve Jenkinson, called him down and Bernie was unable to continue. The winner was Glen Matthews (Vic) with his Picco-Little Toni combination, which is very reliable and a fast performer. Glen is now top man in QM. Second was Tom Jacobsen (SA), also flying a Rossi powered model, with Bolly G22 prop. Third was Brian Steele with Little Toni, G22 Bolly prop and OS 21 engine.

1.	Glen Matthews	569.4
2.	Tom Jacobsen	563.36
3.	Brian Steele	561.86
4.	Andrew Kennedy	545.68

Results FAI

No surprises came out of this event. Times were relatively slow, with no-one in the teens. This was possibly due to the rather damp and cold conditions. Ranjit Phelan had the best time; a 1:20.2 from his OPS-Mustang combination. The winner was Brian Steele, who flew a Little Toni and OS with Magic Muffler. He said that the engine had stock timings. He ran a 7¾ x 7 prop, which suited his engine very well. His best time was 1:25.4, and he was very consistent around that mark. Second was Bernard McKay who ran a Shadel Super Tigre engine. He had a best time of 1:24.3. Third was Glen Matthews' OPS-Little Toni, and he had a best time of 1:27.



Brian Steele poses with his ST powered Capella at the Vic State Champs at Mangalore. Airfield is big! Launching downhill for more speed, Brian?

1.	Brian Steele	560.75
2.	Bernard McKay	552.9
3.	Glen Matthews	548.06
4.	Andrew Davies	538.68

Results ½A

At last ½A Pylon is attracting larger entries. Most of the initial problems we have had with ½A have been to do with radio gear failure. I have had a large number of crashes due to pot and wiper problems on miniature servos. The reason for this is that you **cannot** run a ½A **unless** you have servos with an **indirect drive** (Remote Pot). You may get away with it for a while, but sooner or later in you will go. (Instant kit!)

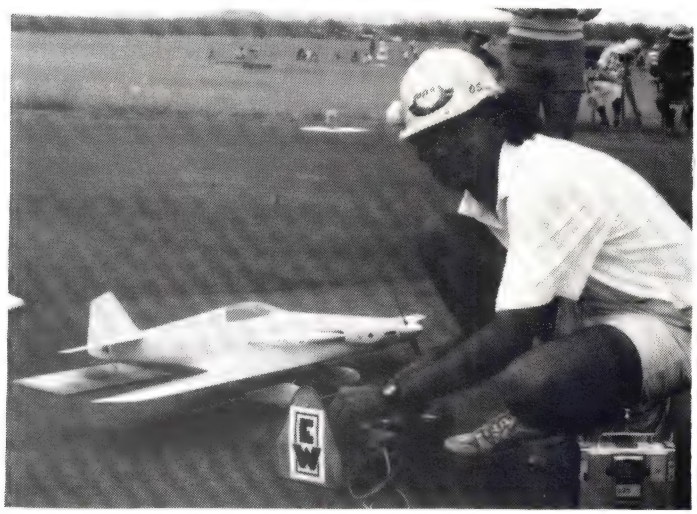
In between heats I went down to No. 1 pylon to see what it is like to press the button on these small models. Frankly, I found them hard to see. The problem was fixed when the starter explained the colour scheme of each aircraft. The main problem is that when these tiny models fly straight at you they virtually disappear. I then positioned myself down towards Nos 2 & 3, at the distance where the old course size No. 1 pylon had been, and still had problems. So, in my opinion, no matter where the No. 1 pylon is situated, ½A models will still be hard to see.

The winner was Keith Harvey flying an ST powered Capella. Second was Jim McKissack, also with a Super Tigre, and third was Andrew Kennedy using an OS CZ engine. The CZ engine is somewhat different from the ST because it must rev out to be competitive. To get the best and most reliable performance out of an ST you are looking at about 20 to 22 thousand rpm on the deck. With the OS CZ, 24 to 25 thousand

should be the aim. All you have to do is prop the engine to obtain these revs. Start with a 6 x 4½ or 6 x 5 prop and trim it down to get the desired rev range. However, make sure that you run the engine in first, otherwise you will have to trim a prop down to a very small diameter. Once the engine is run in with the piston and liner nicely bedded, it will develop more power and will be able to turn a bigger prop.

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Full Ahead are now making streamlined FAI wheels. These are very similar to the old style Kraft Hayes wheels. Harry Baldacchino, the proprietor of Full Ahead, originally made some up with plastic hubs, in the same manner as the Kraft Hayes. These were unsuccessful, so Harry has modified the design, which now features an all aluminium hub with a steel axle. These wheels are now indestructible; without doubt the best wheels available anywhere in the world. He said that he will replace any of his old style plastic hub variety with the new aluminium type for a change-over of $10, which is a very fine offer. He will be marketing a range of tanks in the near future. These are supposedly bullet-proof, and he will have some that will suit our QM, FAI and ½A models.



Peter Pennisi was third in FAI at the Nats with his Midget Mustang, ST 40 powered. Nats photos by the columnist.

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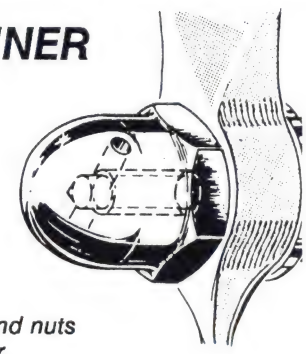
This is the best way to keep yourself informed about what is happening in pylon.

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R. Langham	106.9	T. Bowmaker	110.7	L. Bollenhagen	97.9
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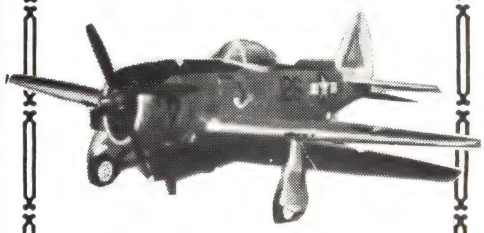
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Flight Analysis No.44

by Martin Simons

39. WIND AND WEATHER (3)

The Nature of 'Rough' Air

In thinking of the effects of turbulence on model flying, we should consider first the way the air itself moves on what we call a rough day. There are gusts, especially those set in motion by thermal convection, even on relatively calm days, but more usually the variations that make for 'rough' air are superimposed on a general wind. The records of any weather station show that wind is rarely steady. Even over clear ground a typical chart of wind speed measured at mast height looks like the sketch in Figure 39.1. Here increases of wind speed appear as upward pointing spikes on the chart, and lulls show as downward spikes. The wind speed varies on either side of a mean, or average, speed. There are about as many lulls as gusts. If each gust were followed by another increase in wind speed, and then another and another, with no intervening lulls, the wind velocity would reach cyclone force very quickly, which would spoil everybody's day! Of course, if a gale or cyclone is coming, the mean wind speed may rise quite rapidly, but still there are both lulls and gusts of short duration, superimposed on the more gradual change. On a chart of this kind, a very marked lull might bring the wind speed down, temporarily, to zero, which is obviously less likely on days of high mean speed than on days with a relatively gentle breeze.

Weather forecasters generally state the mean wind velocity expected, and predict gusts up to some higher velocity. Lulls of about the same magnitude should be assumed. That is, if the top gust speed expected is 10 knots (about 5 metres per second) above the mean, the lull will be about 10 knots below the mean. Such a wind variation, from slowest to fastest about 20 knots, is a very severe change in proportion to the flight speed for an ordinary sports model aeroplane or glider. Models, being relatively small and slow compared with full-sized aircraft, are more severely affected by turbulence.

A fairly sharp 5 knot gust and lull sequence; 10 knots variation from peak to trough; is negligable to a Boeing 747, would be noticeable to a Piper Cherokee, dangerous to a light two metre span glider, and serious trouble for a small free flight model.

Lulls are not often mentioned in forecasts because damage to property on the ground or at sea is not done by lulls in the wind. For our purposes, however, depending on the speed, direction and attitude of flight relative to the air, it can be more dangerous for a flying model to experience a sudden lull than sharp gust.

Fortunately, changes of wind speed are hardly ever 'sharp edged', although in severe storms they can come dangerously close to it. By a sharp edged gust is meant one which comes with no warning at all. There is usually at least some softening of the edge. Wind speed increases over a certain period, perhaps a few seconds, to a maximum, then dies away rather than suddenly ceasing. This is suggested in Figure 39.2, which represents a section of the chart of Fig. 39.1, with the time scale stretched to show more detail. The curving line on the diagram represents wind speed and, as shown, the variations tend to swing up and down around the average or mean.

The same kind of thing happens with wind direction. If the wind is, on average, from the west, then it may be expected to vary a few degrees on either side and, over a short time, about as many changes will come from one side as the other. An approaching change of the general wind direction will appear as a shift of the mean, but still with swings on either side. Very probably, though not necessarily, a change of direction will also involve a change of velocity.

There are, of course, occasions, such as the passage of a front, when the wind goes through a large change of both direction and speed in a comparatively short time. Even so, these changes are usually measured in hours, or at worst minutes, rather than in seconds. Fronts and squall lines are often much more than mere changes of wind direction and speed. There may be violent turbulence associated with rolling motions in the air ahead of the front, and there will almost always be strong upward and downward motions.

It probably hardly needs saying that, when there is any wind, to fly a model in the neighbourhood of trees, tall hedges and buildings is hazardous, and not merely because the model may hit an obstruction. The tree, or whatever it is, will create air turbulence which may be severe enough to throw a model out of control (Figures 39.3 and 4). The air tends to form vortices which, once started, persist for some time and move along with the wind. Downwind of a tall, circular or square tower, there is commonly a 'vortex street' of the kind first described and studied by Theodor von Karman. The diagram is a poor illustrration of this, for the vortices are highly mobile, and the 'street' can writhe, snakelike, from side to side, and up and down. Such turbulence may appear as a sudden and more or less random effect, throwing a model aeroplane about.

Gusts and wind direction changes, as measured by the standard instruments on a mast, are horizontal. For aircraft the vertical motions of the air are more important. On most days fit for flying models at all, there are up and downcurrents and, on average as much air comes down as goes up. This does not necessarily imply that they move at the same speeds. A small, concentrated upcurrent may contain a very rapidly rising 'core', and be surrrounded by a wide region of gently subsiding air, for example.

Although sailplane pilots often think of thermals as more or less vertical rising columns, in fact they are also vortices of various kinds, with axes of rotation both vertical (as in a dust devil) and horizontal (ring vortex shaped).While a sailplane pilot learns to seek out the 'ups' and remain within them to soar, a powered model will meet both up and down motions following one another, just as gusts and lulls in the wind tend to alternate. Fortunately, as with the other variations, there is always some softening of the edges. A further article will look at these points more closely.

The Hazards of Turbulence

As has been repeatedly emphasised in previus articles, the airflow a model feels is entirely due to its own motion through the air, not to the wind. It often seems to the person standing on the ground that most gusts and lulls are aligned with the wind to some extent. We see and feel them as variations of a mean, and this is indeed what the instruments on the ground record.

But the model in the air does not know the mean wind diretion. It knows only the force of gravity, which is always vertically down, and the effects of airflow over itself. Since turbulence is frequently in the form of vortices, a gust-lull sequence is likely to come from any direction relative to the model, at almost any time.

An analogy which may be useful in under-

Figure 39.1 Typical chart of wind velocities

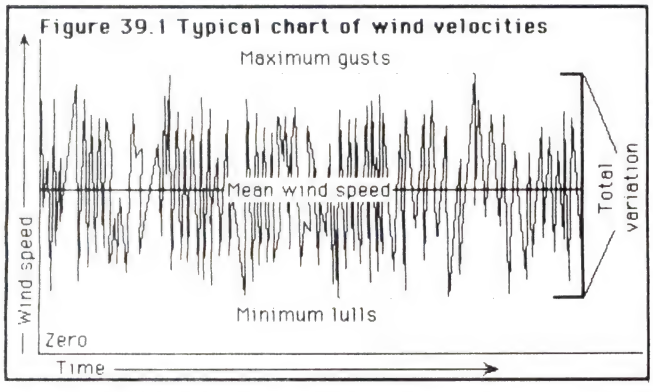


Figure 39.2 Chart with expanded time scale

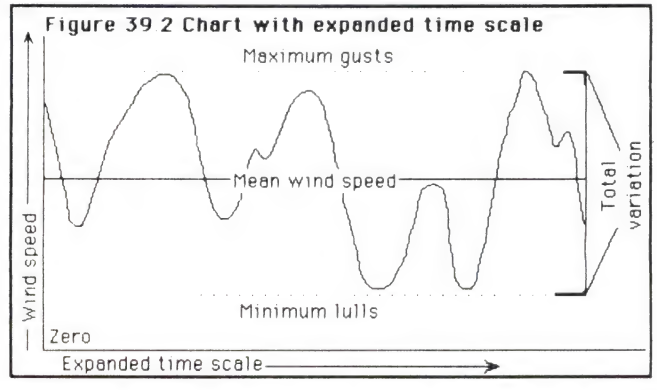


Figure 39.3 Airflow over obstructions

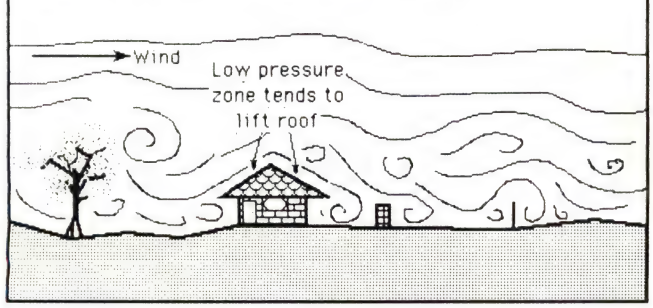
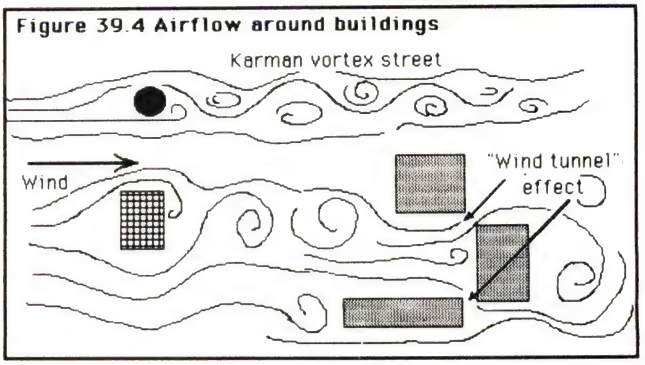


Figure 39.4 Airflow around buildings



standing this is to think of a river in which there are numerous small eddies or whirlpools being swept along in the current. In water, as in air, the whirls may be orientated vertically or horizontally, or, in fact, at any angle. The main stream itself may change direction somewhat from side to side, and may have rapids and calmer stretches, but the most violent changes are in the neighbourhood of the smaller vortices. A small fish may have little idea of the motion of the whole stream, but is very much aware of the turbulence it meets as it swims. A whirl in the water as it passes through may appear as a 'gust' followed by a 'lull', or a 'lull' and a 'gust' with, usually, sideways and vertical motions as well.

From the position of an angler on the river bank, the fish may be seen to be thrown this way and that as it swims upstream, downstream or across the river, and the buffeting does not increase or decrease according to the direction of swimming. In the same way, the reactions of a model aeroplane seen from the ground will be superimposed on the general drift, and hard to interpret. Apparent speed and track over the ground will vary, depending on the direction and speed of flight and the wind, as was discussed in the previous article. Onto this general motion, the effects of 'whirlpools' in the air will be superimposed.

The Model in Turbulent Air

We may now think about the effects of gusts and lulls on models in flight. A very simple case is taken to begin with. In Figure 39.5, an aircraft is shown with its airspeed represented by an arrow of a length proportional to its airspeed. It is assumed here that the model is in trim. That is, the total of all the pitching forces has been balanced out by positioning the elevator and other controls. The total aerodynamic forces, whatever their origin (thrust alignment, drag, pitching forces from wing and tail, propeller, flaps if any, etc.) are all exactly supporting the weight at the centre of gravity with no tendency for the model to pitch either nose up or nose down.

Suppose that there is a moderate gust which comes from directly in front of the model and is of a strength suggested by the length of the appropriate arrow. The model feels an increase of airspeed. The effect is not instantaneous because, as mentioned, gusts are not sharp edged, but the change is often quicker than the model's reactions, and certainly will be too quick for the pilot to take action until after the worst moment has passed. The model's inertia resists any change of its equilibrium and momentarily, at least, the air is moving by faster.

Although it may be thought that a gust from directly in front will affect the wing (of an orthodox model) *before reaching the* tailplane, the time interval is so brief as to be negligible. Both wing and tail (or foreplane and mainplane of a canard design) will feel the increased speed of flow practically simultaneously. The total lift of a wing and tail combination acts at the aerodynamic centre of the aircraft, and the force depends upon the speed of the airflow and the angle of attack. A gust coming exactly 'head on' in the way supposed does not, at first, change the angle of attack but the extra airspeed will increase the total lift. Briefly, the total of upward forces on thr aircraft will exceed the weight. The original equilibrium situation is thus changed by the gust. There will be an initial upward acceleration.

Since, with a normally stable aeroplane or glider, the aerodynamic centre of the aircraft is aft of the centre of gravity, the total pitching moment also changes. Several factors come into play. For instance, a propeller meeting a sudden increase of airflow will experience a momentary unloading, and the thrust will fluctuate as the engine first tends to race, then slows down again. Drag force also alters, and may not be in line exactly with the thrust axis, so a change of airspeed may alter the pitching balance of these two forces. These effects will be ignored. (It is unwise to forget them altogether, especially if the model has an unusual layout.)

The main effect of the sudden increase of lift at the aerodynamic centre of a stable aeroplane, behind the CG, is to cause a **nose down** pitch following the initial upward acceleration. The corrective pitch decreases the angle of attack, tending to bring the total lift back to what it was before. There are, of course, always some dynamic oscillations, but a stable model will tend to recover of its own accord.. Conversely, if a model enters a lull so that airspeed decreases, lift at the aerodynamic centre becomes less than the weight, and a downward acceleration occurs, stability then tends to increase the angle of attack, and lift comes back towards the normal and recovery follows. When another gust-lull sequence comes, the whole process begins again.

Gusty weather therefore means that there will be inescapable nose up and nose down pitchings and variations of airspeed. Obviously, if any such change takes the model below its stalling speed there will be a much more violent reaction. This is much more probable with a lull than with a gust, for, as seen, a reductrion of airspeed results in an increased angle of attack. Low speed and high angle of attack are exactly the combination required for stalling.

Note, however, that if the model had been flying the other way in the diagram, the initial gust would be, from the model's viewpoint, a sudden lull, and vice versa.

The pilot, recognising the numerous pitching motions of the aircraft in rough air, may attempt to correct them. This may be necessary if they threaten to become too great for safety, but it is often safer to let the model's natural stability take care of things. Attempting to correct small deviations from the desired flight path with the controls can easily produce pilot induced oscillations (PIO). When a small pitching motion is seen there is a slight delay, the pilot's reaction time, before the elevator is moved. In this brief interval the stable model will already have begun to correct the motion, so the pilot's effort may come when the model is already beginning to pitch back. The control movement then tends to overcorrect, and a more violent pitch than required is the result. Again the pilot takes a little time to react, and his correction again comes when the stability is already trying to correct the motion, and the whole sequence quickly gets out of hand, the model moving violently up and down as the pilot furiously pumps the controls. Similar PIOs can, of course, occur around any or all of the aircraft's three control axes.

Vertical Gusts

When a model flies into a vertial gust, or upcurrent, as the arrows indicate in Figure 39.6, even if the upgust itself is at ninety degrees to the line of flight, the resultant flow actually striking the model is inclined upward at an angle. (It is a bad mistake to suppose that on entering an upcurrent the model suddenly meets flow from directly underneath it. If it did both wing and stabilising surfaces would immediately be in a super-stalled condition, and might never recover.) There is an increase in the angle of attack and hence an increase in lift. (There is also a slight increase in airspeed, but this will be ignored.) If the upgust is very powerful the increase in angle of attack may be enough to stall the wing, but this is unusual. The more normal result is a fairly sudden increase in lift force which, as before, creates an imbalanced situation with an excess of lift over weight and hence a sharp upward acceleration. A stable model will try to correct this by returning the angle of attack to normal, pitching nose down again. Correspondingly, a down gust causes a reduction of angle of attack, a downward motion and a corrective nose up pitch.

These reactions to up and down gusts are of special significance to thermal soaring gliders. The pilot of a radio controlled sailplane learns to interpret model reactions to indicate when a thermal has been entered. The stable model, after the first visible oscillations, will attempt quickly to settle down again to the same airspeed as before meeting the thermal. If the first reactions are not very pronounced, the pilot may miss them and fly right through the lift. However, if the pilot does recognise that the model is in a thermal, the aircraft will be under full control and ready at once to turn in the lift. Once established in it, stability will help to maintain a smooth and

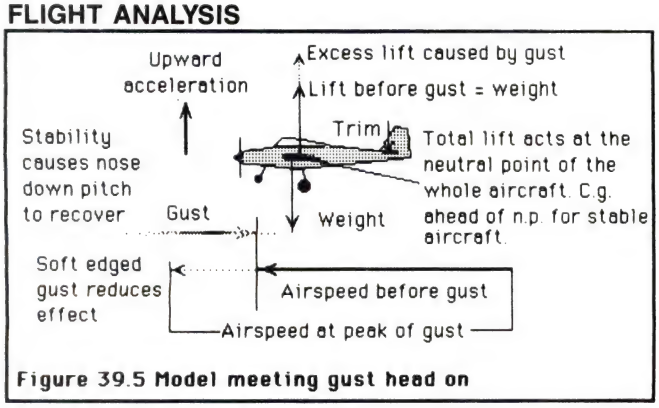


Figure 39.5 Model meeting gust head on

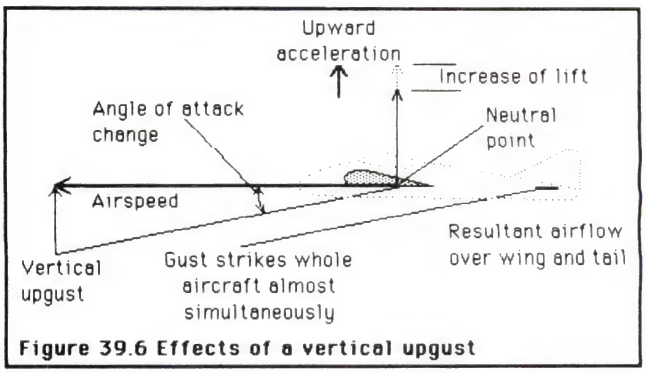


Figure 39.6 Effects of a vertical upgust

truly circular flight relative to the air. Thermals are, of course, internally turbulent, and positive stability is a great asset when trying to get the most from the upcurrent.

Some model sailplane pilots believe that a glider verging on instability, with the centre of gravity well aft and getting close to the neutral point of the aircraft, gives a clearer indication when entering a thermal. The initial reaction is much the same but, if the model is not very stable, it makes less effort to restore normality, and the resulting pitching motions may become consideraby exaggerated, even to the point of stalling. While such a relatively violent movement may indeed signal to the pilot on the ground that something is going on, it may take several seconds before control is restored. In this interval the model sometines falls out of the thermal ntirely. Even if this does not occur the model is then required to circle smoothly in turbulent air with only a small margin of stability.

Personal taste has a great deal of influence in this matter. Assuming two identical models flown by different pilots, one set up wih marginal stablility (c.g. aft) will have very sensitive, even twitchy elevator control, so the alert pilot can often prevent the stall on striking gusts and keep control as the model enters a thermal, maintaining the turn thereafter with numerous small control movements. Another pilot, rigging the sailplane with the c.g. well forward, will possibly receive less obvious signals on encountering the thermal, but can then rely more on the model's natural tendency to maintain its trimmed attitude. Such a model will circle accurately hands off for long periods, despite turbulence.

Side Gusts

If the supposed gust arrives from another direction altogether, such as at some angle to the flight direction, the effect is indicated in Figure 39.7. The combined effect of the model's speed through the air and the gust from this angle is to produce, briefly, a resultant airflow over the model as indicated by the arrow R in the diagram. As with the vertical gust, the airflow does not strike the model at right angles, but is inclined at some angle. Since the resultant is the longest side of the triangle, there is also a gain in airspeed, to which the model will respond, as before, with a stable readjustment, but there is also a lateral element to the new flow, to which a model with adequate vertical tail area will respond by yawing into the gust. The model swings as far as possible into line with the resultant flow. As before, changes one way are normally followed by changes in the other sense. When the model meets a gust from the opposite direction it responds, as before, with pitch and yaw into the gust.

Complications

In flight the simple cases used above for descriptive purposes are hardly likely to occur. Almost always a gust will be partly up, partly from one side or the other, and partly from in front. Similarly with lulls (gusts from behind) and downgusts. It is also possible, in an atmosphere with vortices of various sizes, for a model to be affected more on one side than on the other. Sailplane pilots, for instance, often recognise a thermal by noting one wing of the model being pushed up and the aircraft is then made to bank and turn the other way and, with luck, so fly into the thermal. To describe every possible case would require a much longer article, and it is doubtful if every possibility would be covered even then.

The Effect of Airspeed

In gusty conditions variations of airspeed and angle of attack are inevitable. The greatest danger comes from stalling unexpectedly, and it is therefore best to fly somewhat faster than in smooth air. This gives a greater margin of airspeed above the stall, and quicker control response if an emergency arises.

Since the greatest danger to a model is loss of control near the ground, and turbulence is also more severe low down, it probably does not need to be emphasised that flying low and slow on a rough day is very dangerous. The initial climb after take-off in such weather should be shallow, to allow a high airspeed to be maintained. Faster trim is required at all stages of the circuit before landing, until the moment of touchdown.

The Wind Gradient

The wind gradient effect on a landing model (or full sized aircraft) was mentioned briefly in the previous article and, mainly in connection with dynamic soaring, was also described in No. 34 of the present series. It will now be examined more closely. The atmosphere may be regarded as having a boundary layer, very similar to, although much thicker than, the boundary layer formed over a wing or fuselage in flight. When an aircraft is approaching into wind to land, it must pass through this boundary layer (Fig. 39.8).

The wind meets resistance in the form of friction with the ground and direct obstruction from buildings, trees, small bushes, fences, crops and the grass of the flying field itself. As well as creating turbulence, this slows the air down generally near the ground. The lowest layer of air hardly moves at all. A few centimetres higher up the flow is less restricted, but there is still a considerable reduction of wind speed. At a full metre above the ground there is much less slowing down, but the breeze felt here is less than that at the top of a windsock mast or flagpole. The effect, known as the wind gradient, extends up for a considerable height. Slowing of the wind is quite detectable at 50 or more metres above unobstructed level ground, but the greatest change of wind speed is in the lowest few metres. The strength and depth of the gradient varies greatly with the speed of the wind. On a fairly calm day there may be hardly any detectable gradient, but if there is a stiff breeze the boundary layer becomes much thicker and more pronounced.

As it makes the descending, straight approach to landing, the model's airspeed will initially be determined by the wing angle of attack, which is governed, as usual, by the elevator. A powered model will normally have the throttle closed, or nearly so, thus becoming, in effect, a glider. A sailplane might have its brakes or spoilers open. As it settles into the wind gradient the model meets air which is moving towards it at progressively less and less velocity as it gets lower. It is, in a sense, flying into a lull in the wind speed, but as it gets lower the lull becomes more pronounced. There is a loss of airspeed, and, since the model may already be flying slowly preparatory to landing, this can be serious.

As stated above, a model confronting a lull in the wind, and losing airspeed briefly, loses lift, and there is a downward acceleration. Natural stability assists the aircraft to recover, but there is an inevitable loss of height. In the case of a landing model the height loss brings the model immediately deeper into the wind gradient, where the air is moving even more slowly. More airspeed is lost, the downward motion tends to increase, and things get worse. A heavy landing is the least that can be expected. At worst the model stalls and pitches nose down into the ground.

With a powered model, if the pilot recognises soon enough what is happening, the situation might be saved by opening the engine throttle slightly and using the extra thrust to recover the lost airspeed and lift. With a glider, of course, this cannot be done. Air brakes or spoilers, if open, might be closed, which, by reducing drag, has the same effect as opening the throttle for a short time, but this saving action can be performed only once on an approach, and if it is not sufficient there is nothing else to be done.

The answer to the problem is to make sure, at the start of the approach, that there is a good margin of airspeed in hand so that descending into the wind gradient will still leave enough flow over the wings to maintain flight all the way down to the ground and keep control for the final flare for landing. The trim and flight speed should be adjusted and given time to settle, preferably on the downwind section of the circuit.

Note that the allowance of extra airspeed for the wind gradient is in addition to that required to cope safely with the turbulence that may be met. If there is any doubt, it is far better to have

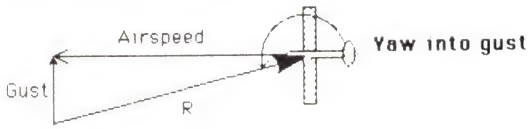


Figure 39.7 The effects of a side gust

some surplus airspeed just prior to touchdown, with the resulting slight bounce or long flare-out, than to fall to the ground in the wind gradient on approach.

A point that is worth noting here is that, while the airspeed of a model may be reducing as it descends through the gradient, its ground speed tends to rise because (as noted before) the ground speed when heading into wind is a product of airspeed and windspeed. Thus, even as the model's airspeed decays it may actually cover the ground faster. When attempting a spot landing this can be very frustrating, since the aircraft seems to pick up speed and may look like overshooting, yet suddenly it stalls and falls heavily, short of the spot. The airspeed is what keeps the model flying and under control. The pilot should not be deceived by the apparent excess of ground speed in the last stages of the descent.

The wind gradient also increases the danger for models making turns near the ground. A banked turn within the wind gradient places the wings in airflow of different speeds with correspondingly different lift forces. This asymmetry is, of course, additional to any difference that may be brought about by use of the controls or brief out of trim conditions, side-slip, skid or adverse aileron drag. At a critical moment the model may behave in an unexpected way, and a crash is very probable.

Downbursts

Within any ordinary flight it is unlikely that the model will run into a sudden complete change of wind direction, although relatively sudden changes of wind can occur. Full-sized jet passenger aircraft, as well as light aircraft and gliders, have crashed as a result.

The most likely occasion of such a catastrophe is when a downburst happens in the neighbourhood of a large thunderstorm (Figure 39.9). Within cumulo nimbus clouds there are very powerful upcurrents. The air going up has to be replaced by air coming down, usually round the fringes of the storm. Cold air pours down, sometimes in a concentrated stream, almost like an avalanche. On nearing the ground the downburst spreads out in all directions, causing extremely violent changes of wind over limited areas. An aircraft caught by such a sudden change near the ground may lose most or all of its airspeed and crash. Modern aviation authorities have set up warning systems to deal with the problem, but not always with complete success. A downburst may occur with little previous sign of its approach and be gone almost as suddenly as it arrives.

Phew! Who'd be a bird?



DH.50A

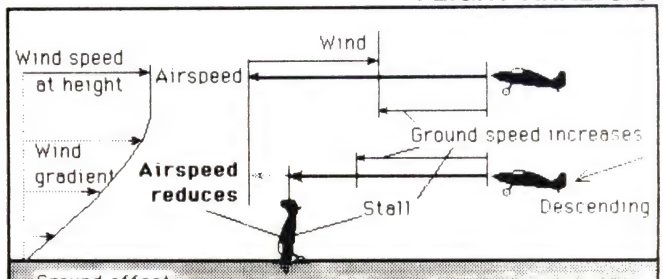


Figure 39.8 The wind gradient effect on landing

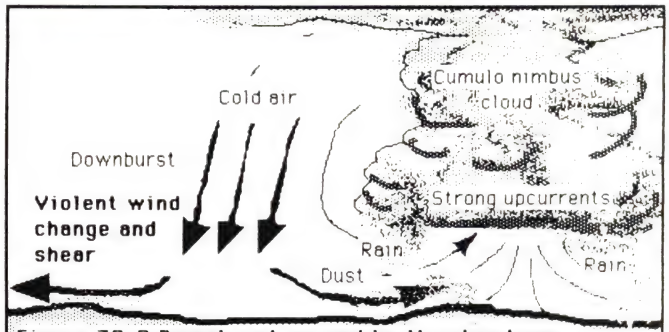


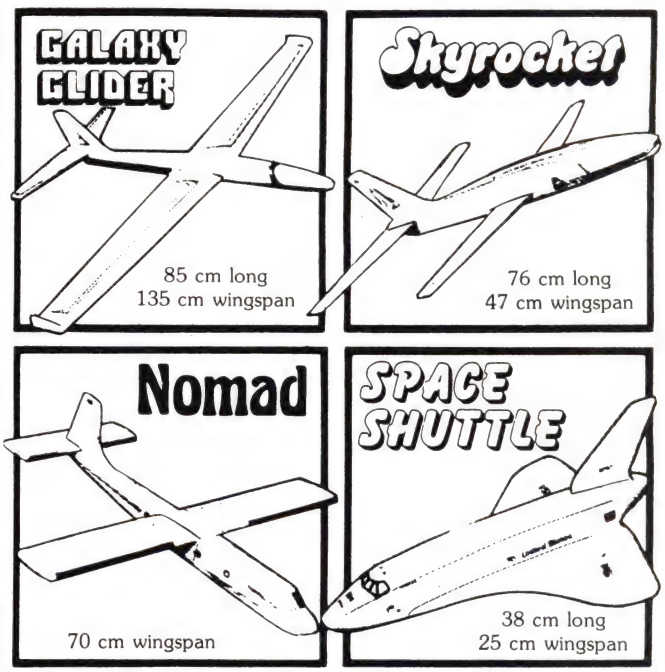
Figure 39.9 Downburst caused by thunderstorm

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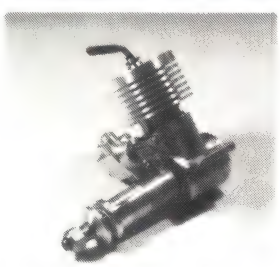
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BY MAX TANDY

CORRESPONDENCE

A letter from Shaun Nielson from the Rotary Flight Club of NSW tells of a Handicap System they used on their Fun Fli day which gives novices an equal chance of winning events.

"As a relative newcomer to the wonderful world of RC helicopters, with not much more than nine month's experience, I was a bit apprehensive when it was announced at our club that a fun fly had been arranged. 'Great!' I thought. 'The experienced flyers will have a field day and we beginners won't have a chance.' The executive committee of the Rotary Flight Club of NSW had the same worry, apparently, as the scoring system for the competition soon showed. Three tasks were assigned to each competitor: a limbo; pick up a wire loop; and bottle knock-over. Two minutes were allowed for the first and second tasks, with a maximum of five minutes allowed for the third. The scoring was as follows:

10 points for each pass under and over the paper tape; 50 points for picking up the wire loop, and 50 points for dropping the loop in the marked circle, plus a point for each remaining second; and a point for each second remaining after knocking over all ten bottles. The saving grace of this system was that the flyer's total score was divided by the number of months flying experience, thus giving the beginners a real chance to be competitive.

On paper the event looked simple enough. Expert flyer, Julian Clutterbuck, gave a demonstration of how it should be done, making it look, to this flyer, remarkably easy. Competition began with a large variety of models present: three Kalt Cyclones, an X-Cell 60, a Concept 30, GMP Legend, Heim Star Tariner and Hirobo 808. Results of the competition showed how good the scoring system was. George Benedek with his Concept 30 came third and Peter Vambaris came second with his X-Cell. The biggest surprise was the winner: me and my Kalt Cyclone! My not so good overall score was helped tremendously by my relatively low handicap of 9.

A great time was had by all, with some aerobatic displays from Manfred Lymant and George Benedek before competition and during lunch."

Shaun Nielson takes off to tackle ten green bottles, standing on the wall; I mean 10 plastic Coke bottles to be knocked over with his Kalt Cyclone. Wayne Bradwell, left, and Julian Clutterbuck, right, judge his performance. Photo by Mike Piquemal.





Patrick Esmond of Emerald in Queensland with his Falcon 555. Not such a novice now! Tail boom supports are re-inforced with arrow shafts.

A NOVICE VIEWPOINT

Patrick Esmond continues from the last issue where he described how he managed to learn hovering. Now he is flying circuits...

"Here is the next segment regarding our progress, and I've called it Progressing Into Forward Flight. These ideas mainly concern helicopter flyers who have had experience at flying fixed wing models. Before entering into circuits I would recommend that you must be able to take off and land to a spot or small area consistently, and be able to climb (hovering) to a height of 30 to 40 feet, from which you can descend and land back on the desired spot. I don't believe that you need to be able to hover with the heli facing towards you at this stage, but you must be able to use the tail rotor control to make it face the way you usually do, while hovering. I found it easier to fly circuits without a training undercarriage attached, as it is easy to become disorientated while banking because you tend to watch the sticks.

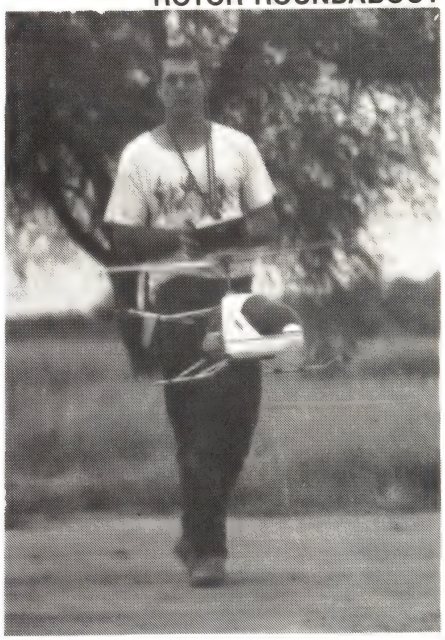
There are a couple of points worth knowing before you attempt forward flight. If your model's rotor spins clockwise when viewed from above, once some speed is attained the model will want to bank to the right. This is because the rotors travelling into the wind on the left side create more lift than those retreating on the downwind (right) side, thus causing a bank to the right. My Falcon 555 needs about 4 clicks on the roll cyclic to trim it level for fast forward flying. It turns to the left, especially while reducing power, such as when turning onto final approach. The tail will want to swing in to the left; i.e. nose right, so the tail rotor control must be fed left stick to keep the turn balanced otherwise a bad sideslip will develop. I believe that turning and facing the transmitter the same way that the model is flying helps keep the lefts and rights in the correct sense, even if you have to look back over your shoulder a bit while approaching for a landing. It is especially helpful for controlling the tail; i.e. yaw.

Before taking off for a circuit I move the forward-rearward cyclic trim forward 2 clicks. This is so that the model will maintain a slow, forward motion and not tend to slide backwards. I leave the roll cyclic trimmed for hovering, but stay prepared for that turn to the right. On the first occasion that I was flying around in a circuit with the 555 I was shaking so much that I could barely keep my thumbs on the sticks so, rather than attempt a landing I kept doing figure of 8s and turns each way, and I realised that this wasn't so hard after all. A couple of times the model lost all forward speed, and even started sliding backwards in an alarming manner. My recovery method was to increase power and poke the cyclic forward which makes the model just fly out of trouble. I use this even now, sometimes; it works every time. OK; here's the circuit and what to expect.

Get into a hover a couple of feet up, holding a small amount of back cyclic due to the trim being forward 2 clicks. Increase power to ¾ while feeding forward cyclic and holding. The model will accelerate away in a steady climb. Once a height of about 50 feet is gained, bank the desired way using roll cyclic and some tail control in the same way. To come round in the turn the forward-rearward cyclic must be pulled back a



Ian McDonald attended the Round-Up from Sydney, and gave his weekend to assist other pilots. Whose is this X-Cell? Photo by J.C.



Patrick Esmond's pal, Carl, flying his Cricket 25 at Emerald. Model has an OD canopy and OS 25 FSR.

fair bit. The model should be turned so that it is flying on the downwind leg of the circuit. Don't get too far away, and don't bank too steeply.

With the model now about 100 feet up, about 70 metres away, travelling quite fast and still climbing, reduce power to a bit below hover power and relax forward cyclic to neutral. If you have flown planes you will probably keep flying around for a while, but for those who want to get down again, here's what to do.

Turn the model into wind toward the landing point, again using a combination of left roll and left tail, and reducing power slightly. I think a good point here is to be facing the same way that the heli is travelling so that left and right are natural. So now the heli is coming towards you and you must reduce the power further to obtain a descent and you are holding a bit of back stick to get the nose up and use the rotor as a big air brake. The heli is down to about 30 feet, is 50 metres away and slowing down.

If the descent rate is building up, some power should be added. If the descent is getting too slow, cyclic is released to neutral, but the 2 clicks of forward trim already added should keep a forward motion maintained. The mistake that I used to make at this point was to add too much power and arrive at the landing spot while still about 40 feet in the air. Believe me, the model is much easier to land from 10 feet that from 40! Try to make the model arrive so that it is viewed from the same direction that you are comfortable with while hovering, and instead of looking at the model as a whole, focus your attention on the spot that you watch while hovering. For me this is the rotor shaft where it exits from the frame, which is actually the balance point of the model.

So, the model has returned, about 15 feet up, all forward speed is lost, and it is still descending but the tail is low. It's about to drift backwards because you have been holding back cyclic. Immediately add power and, using the tail rotor, turn the model to face your familiar direction, which is into the wind, and catch the heli back into a hover. Then, if you have been practising getting it back down from this height, just do what you have been practising. I know that this sounds fairly uncomplicated, but in reality it's much more dramatic, and everything seems to happen at once. You have to remember how to get out of trouble; i.e. add forward cyclic and power, and don't be tempted to slam the model on the ground just to get it out of the air. The rest comes naturally.

I am now doing basic aerobatics with the Falcon 555, stall turns and wing-overs. I have had only three minor mishaps. The first was before I bought a gyro and I broke a blade. Since then I've had an engine quit while approaching to land. I auto-rotated down into some tall grass with no damage. Last week the model's radio antenna fell off; it had weakened from me standing on it and trying to pick the model up at the same time! Luckily the model was only three feet up at the time. A couple of links were broken and the rotor shaft was bent in the out-of-control landing. I have now purchased a small coil type antenna which fits inside the canopy, from Max Tandy, which works well.

Another modification that I have done to the Falcon 555 is to offset the fixed tailfin by about 10°. This is to make the model track straighter and to reduce the amount of rudder needed in left turns. This has made the model much nicer to fly.

Max, Warren is flying his X-Cell 60 well, and is into forward flight. Carl, with the Cricket 25, is doing circuits, and we are all on the edge of basic aerobatics, so we will keep you posted on our progress. I will be down your way in September, so perhaps you could arrange an X-Cell for me to test drive!"

Thank you Patrick. This is what a **Novice Viewpoint** is all about: "I've just done that, and this is how it happened." Rotor Roundabout is



Warren Thompson of Blackwater in Queensland has just achieved hover with his X-Cell 60. Hope you have read Pat Esmond's notes, Warren! Tandy photo.



Bruce McDonald applies a little body language while talking with his X-Cell! At Jimboomba. Tandy photo.

everyone's soapbox, so if you would care to write down your views on any aspect of the hobby, whether it is the mods made to your chopper, or how you straighten your bent rotor shafts, we will print it in this column. Go for it!

THE HELICOPTER BOOM IN QUEENSLAND

The 27th & 28th May were the dates for the Rotor Roundup event held at the Jimboomba flying field. This is now an annual helicopter meeting on the MAAQ calendar, sponsored by R/C Helicopters Australia. The purpose of this meeting is to Round Up as many beginners as possible and have the experienced flyers help them to get hovering.

It was a huge success, with over 30 helicopters arriving over the two days, and the majority were real beginners. Initially letters were sent out (over 30) to all Out of Town people inviting them to take part. The experienced flyers were invited with the knowledge that they would be needed to help others. And they did just that. It was well worth the effort of organising this event to see so many newcomers up and flying.

I must tell you about how this type of meeting came about, because it's been nagging me for some years. (My Soap Box now!) It started about 8 years ago at the first of the Sale Helifest meetings. People turned up in droves and everybody flew their choppers. It was common to see 5 or 6 all doing their thing at the one time on the field. The transmitter pound had to be manned by two people, and you were allocated 20 minutes each time your frequency was available. This was **fun flying,** and nobody was much better than the next guy.

Then things changed. A lot of those flyers became well known Hot Shots who were pretty to watch, with their fantastic hovering skills and breath-taking aerobatics. At subsequent Fun Flys, the **gods** would take it in turn to **perform,** and everybody watched to see who wouold outfly the others. The Novices would shrink into the background and the training undercarriages, that used to be commonplace at these meetings, became an embarrassment to their owners. This type of situation does not occur at normal club fields because everyone knows each other and their level of flying. It seems to happen only at BIG organised FUN FLY meetings where both beginners and experienced flyers attend, and they are strangers. These big Fun Flys often become DEMONSTRATION Days, and the novices do not fly. Am I right?



Giant scale is getting out of hand! Some flyers arrived at the Rotor Round-Up in their own helicopter. Here Stephen Keefe and his crew alight at Jimboomba. Some smart luggage in the foreground! J.C. pic. Is that you, Julian?

The Rotor Roundup was predominently a 'Help the Novice' meeting, and I believe that club organisers should think about this type of gathering for their own calenders. It is surprising how many people out there would attend.

A NOVICE VIEWPOINT

Although Graham Smith is a little past the novice stage, his discussion about nose-in flying is very useful.

"The thought of being able to hover nose-in has long been a dream for me (and to heli hoverers in general, I'm sure). It seemed to be a natural progression in the learning curve after a long time of hovering tail-in and figure 8 flying. I remember you saying to me earlier that it would come naturally as I learnt circuit work, so, taking the bit between my teeth, I decided to concentrate on nose-in hovering **taking off from the ground.** The intense concentration needed was amazing, as I again went to the complete beginner stage, trying to come to grips with reversing the inputs that had become automatic for hovering tail-in. After about 10 tanks of fuel I eventually succeeded in a reasonably stable nose-in hover, and the buzz that I felt cannot be described.

Then came the big shock that prompted me to write this note. On the ground I turned the heli tail in and tried to take off. Would you believe that I could not hover the normal way (tail-in)? It took about 5 minutes before I had partial control. I had been completely brainwashed by the intense concentration needed for nose-in. I have asked many others about this and some have had the same experience as I had.

My summing up about this method is that it's not all wrong doing it this way. After 1 more tank of fuel I was again stable, and now have no real fear if the heli comes towards me nose-in. In fact, I have now flown my first real circuit in front of myself on the very first tankful after this method, feeling very confident indeed. This may help others trying to decide whether to practice nose-in or just let it come naturally. I hope they get the same enjoyment from this wonderful sport and hobby that I have."

WORLD CHAMPS

The Helicopter World Championships are being held in the USA from 28th Auguast to 2nd September, and our Australian Team will possibly be in America at the time you are reading this, so wish them luck and watch for their r sults.

Contributions to this column, including pho os, can be sent to: **Max Tandy, 9 Smailes Road, Jimboomba, Qld., 4280.**



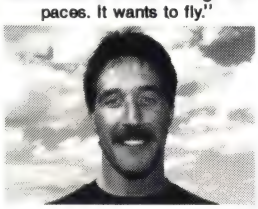
Bodo Hans from Mt. Tamborine hovers an X-Cell at Jimboomba. Lovely setting for chopper flying. Ring Max if ever you get the chance to call in.

THEY ARE HERE IN AUSTRALIA NOW!

THE ALL-AMERICAN X-CELL HELICOPTERS



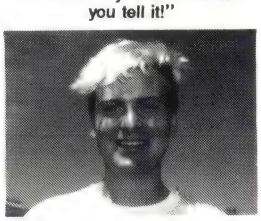
Barry Hendy
1987 Australian Champion
"I thought that I was flying the Top Helicopter until I put Schoonard's X-Cell through its paces. It wants to fly."



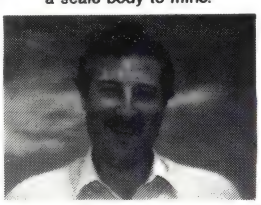
Rob Barbuto
Current Australian Champion.
"My X-Cell won for me. It really is a top helicopter. It makes you feel confident flying it. It's very precise on the controls, which also reflects the way it went together."



Instructor 'Wally'
checks out Marcia Merifield as she solos on the X-Cell. Her comment: "That's incredible! It's so easy. It does what you tell it!"



16yo James Cooper:
"I flew Max's X-Cell 60 then bought one and built it in the school holidays. The instructions are great. I want to fit a scale body to mine."



Paul Webber
Former Victorian Novice Champion "I've owned five other helicopters. Building and flying my new X-Cell was like a breath of fresh air! I only wish that it had been my first one."



Using ultra high-tech materials and technology, the X-Cell 50 & 60 machines have set standards that others will strive to achieve. The instruction manual is bigger than this magazine, and has 40 pages of **real English, leaving nothing in doubt.** The plans are clear, precise and easy to follow. A total of 46 sealed ball bearings are supplied in the kit. Probably the best news is that people starting out in helicopters can now do it all on one machine. This is by far the BEST HELICOPTER THAT A BEGINNER COULD SELECT.
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★ X-Cell takes 1st, 2nd & 3rd in Intermediate!
★ X-Cell takes 2nd & 3rd in Novice!
★ Many other positions were won by X-Cells!

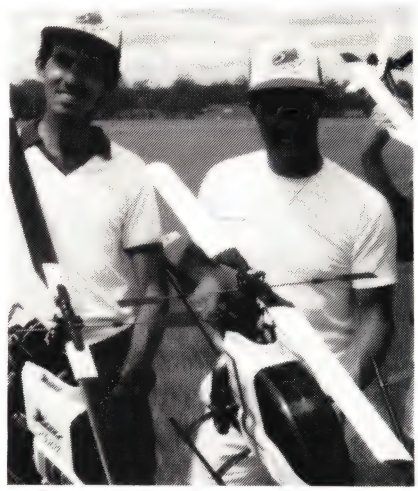
X-Cell has proven its "excellence" under extreme competition world-wide.

ON THE LOCAL SCENE

X-Cells keep winning in Australia!
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X-Cell 60.....1st	X-Cell 60.....4th
X-Cell 60.....2nd	X-Cell 60.....6th

The Australian Helicopter Team are all flying X-Cell 60s at the World Champs at Virginia, USA, August 1989.



Rob Barbuto (right) 1st place '89 Nats; Geoff Woodward (left) 2nd.

PROMOTIONAL VIDEO of the X-CELL HELICOPTER

Featuring: Kit Review, Assembled Model Review and Flying Review, including Flying Aerobatics and Inverted Flight.
Send $20 for item posted anywhere in Australia. $20 will be deducted from the price of the X-Cell helicopter upon purchase, or $15 will be refunded on return of the video. ***Buy one for the club.***

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43rd NATIONAL CHAMPIONSHIPS

hosted by "AEROMODELLERS W.A."

BUNBURY, WA 30 DECEMBER 1989 - 6 JANUARY 1990

SECRETARY IAN CLAPP RSM 132, BOYANUP WA 6230 PH (097) 27 2210 BULLETIN No 2

▲ VENUE

The venue is BUNBURY, WA, which is 180km south of Perth on the Indian Ocean coast. Brunswick is approximately 25km and Australind 11km from Bunbury.

▲ DATE

The Nats will commence on Saturday 30 December 1989 and conclude on Saturday 6 January 1990.

▲ REGISTRATION DAY

Saturday 30 December 1989 at the Wally Scott Hockey Pavilion in Hay Park.

▲ PROCESSING OF MODELS AND RADIOS

Model processing will be carried out on Registration Day at Hay Park. Transmitters will be checked for frequency only. Large model permits (7kg) will be checked at this time.

NOTE: It is the responsibility of the competitor to have radio control equipment checked and labelled at an approved MAAA testing station before registration day.

▲ RULES

The rules to be used are those as published in the MAAA Inc Aeromodels Official Rules & Instructions with amendments up to June 1989 (the blue loose-leaf book). The "Safety Rules advised by FAI shall also be put into effect". A competitor's briefing note will be available at Registration for detail of any FAI Safety Requirement to be applied and which came into force after 30 June 1989.

Contact your state association for rules books.

▲ NOISE LEVELS

The Hay Park site is within the Bunbury City boundary and although this site will not be subject to the 98dB ruling it will be subject to a 6pm-9am curfew, i.e. NO operation of model motors at this site between these hours.

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▲ ENTRY

Entries are to be made on the Official Entry Form or A4 copy thereof. The closing date is 17 November 1989 and events with less than five (5) entrants shall be cancelled. Only those entries received by 17 November 1989 will be published in an Addendum to the Program. Late entries will be accepted up to the time of commencement of each competition, but the late entry fee must be paid.

▲ JUNIORS

- A person whose eighteenth (18th) birthday occurs on or after 1 January 1990.
- Only MAAA sanctioned junior events will be offered at the 43rd Nats but juniors may enter senior events.

▲ ACCOMMODATION

Block bookings have been made at a motel and a caravan park in Bunbury. These facilities are close to Hay Park, the Bussell Hotel and the Glade Caravan Park being within easy walking distances of Hay Park. Bookings can be made through the accommodation secretary, Bernie Rowney (PO Box 1212, Bunbury - phone (097) 21 7236).

▲ OFFICIALS

The successful conduct of the 43rd Nats will be largely dependent upon those people who are willing to give up some of their time to act in an official capacity - so please give these people your full cooperation.

▲ ORGANISING COMMITTEE

PRESIDENT	Max Bowater	(09) 386 8894
SECRETARY	Ian Clapp	(097) 27 2210
TREASURER	Brian Edwards	(09) 381 9023

ADMINISTRATORS:			
	RC POWER	Joe Di Giorgio	(09) 447 1567
	RC GLIDER	Reg Beale	(09) 444 2992
	CONTROL LINE	Steve Walton	(09) 417 1235
	FREE FLIGHT	Peter Fauser	(098) 20 4051
	ACCOMMODATION	Bernie Rowney	(097) 21 7236

For enquiries with regard to your flying discipline please contact the appropriate Administrator.

Any competitor from the Eastern States who needs to send a model in advance please contact a member of the organising committee.

NB: No responsibility for condition of arrival of a model will be taken by the organising committee.

▲ WHY COME TO BUNBURY?

The Bunbury aeromodellers (SWARMS) are extremely hospitable and they welcome you to come to test their generosity and great facilities in exceptional flying conditions. Bunbury is a progressive port city located in the picturesque and fertile southwest corner of the largest State in Australia.

Whilst here at the Nats the Bunbury Tourist Bureau welcomes you to visit the Bunbury Arts Complex and Regional Gallery, the Big Swamp Bird Park, King Cottage Museum, the AB-original shop, the Marlston Hill lookout and enjoy bushwalking, wine tasting, fine food or river cruises. Some spectacular day trips and holiday experiences are awaiting you in the South West (magnificent Karri forests, wild flowers and great surf), plus an opportunity to visit the beautiful city of Perth, dabble at the Casino or visit the dolphins at Monkey Mia after you have tested your aeromodelling skills with us at the Nats.

Locality maps and further information is available from the Bunbury Tourist Bureau situated in the old railway station, Carmody Street, Bunbury 6230 - Phone (097) 21 7922.

ABC MODELS
42-44 Pier St, Perth 6000
532 Albany Hwy, Victoria Park 6100
793 Canning Hwy, Applecross 6153
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MAAA NEWS

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Affiliations. As at the 30th June 1989, affiliations for 1988/89, and for 1989/90 were as follows, with the latter shown in brackets: MAAQ(Inc) 1148 [296]; RCAS(NSW) 2026 [40]; CLAS(NSW) 114 [0]; NSWFFS 75 [0]; ACTAA(Inc) 161 [0]; VMAA(Inc) 2043 [42]; TMAA(Inc) 139 [5]; SAAA(Inc) 539 [0]; AWA(Inc) 503 [2]; NTMAA 58 [1]; giving a total of 6801 for 1988/89, compared with 6853 at the same time in 1988 and 6734 in 1987. The total for 1989/90 so far is 386. Signs are that we are retaining more members but not attracting as many new members as previously.

The percentage decline in membership numbers is greatest in the ACT and then NSW. The former has flying field problems, with housing development and road construction forcing the abandonment of two sites. One new site is closer to Cooma than Canberra. Well, that is not really true, but Tharwa is a fair way out. Of course, it is only a hop, skip and a jump from Canberra to Tharwa compared to the distance some Sydney and Melbourne flyers have to travel to their fields. I suppopse it is a matter of what one is used to: the 17 km to my club field seems a long way after being able to fly just a kilometre from home when I was at Amberley. The good editor of this magazine has the ideal situation: he flies from his back door. *Sanity is worth any price!*

I think I have mentioned it before, but while checking membership records of the late 1950s I have noticed that small communities then each had six or seven members. The same places, most of them now cities, are lucky to have as many as that today. Then most flew control line close to, or even in, town. Now we are banished to remote sites, mainly because of noise. We have deliberately made ourselves invisible (or inaudible?). May I again urge that your club put on static displays of models in, for example, bank foyers, shopping malls, even shop windows, to put models and modelling in front of the public.

Insurance 1. I have heard a rumour that an insurance claim had been rejected because the flyer concerned had used one brand of transmitter with another brand of receiver. I can assure you that in the five years that I have been Secretary, and during another three year period as Technical Secretary to Gordon Burford, the underwriter has not rejected a claim, although some were not proceeded with because the amount claimed was less than the excess. If we could not use mixed brands of equipment, kit system manufacturers would have been out of business long ago. I have built (assembled) two kit receivers - admittedly AM type - and they worked well with the transmitters that I was then using.

Insurance 2. It is about time that I repeated advice given earlier. Should you be unfortunate enough to have your model cause injury or damage, you should deal with your 'victim' as though you had no cover; it is important that you do not tell him that you are insured. If the damage is to property, ask him to obtain quotes for repair. He is entitled to take whatever action is necessary to prevent further damage to his property, such as from water entry. You then must let me know of the incident, preferrably through your club secretary and State Association. All incidents likely to give rise to claims must be reported; not only do we have a duty of disclosure to the underwriter; you are also protecting yourself and the other party against claims which may arise later. I will send you a claim form, to a FAX number if necessary. For property damage you will have to pay the first $250, the excess, so be prepared to be asked for it. You include the quotes and any bills you have with the claim form when you return it to me, and forward others separately as you receive them. If really urgent, you may send the form directly to the underwriters to a contact name that I will give you if asked. It sounds complicated but it really is not. However, it is even easier not to have to make a claim. Please fly safely.

The New National Aero Club. I wrote in the last column about Astronautics Australia taking over the role of the Royal Federation of Aero Clubs of Australia as the FAI representative in Australia. The President of the RFACA told the FAI Council meeting in Paris last June about the proposed change. The FAI has yet to recognise the new body as its representative, and has laid down some pre-conditions. The matter is complicated by a co-incidental bid by a Spanish body to replace its FAI representative. While the Australian change has the sanction of the RFACA, the Spanish bid is opposed by its aero club. The FAI President reportedly commented that new guidelines for any change-over were needed, but that the last review took some five years!

Safety. Issue No. 94 of Airborne had a photo of a model aircraft apparently being used as a launch platform for a boost glider. I lack facts - perhaps the rocket motor was not fitted - but on the face of it the practice causes me concern. MAAA safety rules prohibit the carriage and/or launch by models of pyrotechnic devices, which a rocket surely is. The FAI Safety Code for model rockets (which, admittedly, is not now generally available, but which will be issued as part of Change 4 to the Rule Book) requires a safety interlock to be included in the firing circuit for the rocket. In my opinion this would require a third transmitter to be used for airborne launching, to reduce the possibility of radio interference prematurely igniting the rocket.

The same safety guide also prohibits rockets from being launched at an angle of less than sixty degrees to the horizontal. The MAAA(Inc) underwriters agreed to extend the Asociation's public liability cover to include rockets on the basis that the safety code would apply. A Civil Aviation Order, separate from that applying to model aircraft, covers model rockets; thus it may be permissable to fly model aircraft in an area where rocketry is prohibited. In summary, model aircraft must not be used to air-launch rocket-powered models, whether radio controlled or not! One reason I raise the matter is that a modeller whom I know, on seeing the photo, reckoned it would be fun to fire an air-launched rocket. Others may agree. Do not do it. An unpowered model may, of course, be air-launched.

This was the case with the Bomarc and the Capra 60: the rocket was not powered. I checked with the author of the article before publishing it.

The same issue had a report on the flying of a replica of Keith Hearn's dynajet-powered model. Until fairly recently the only pulse-jet models that were covered by our public liability insurance had to be flown by control line. The underwriters have again extended cover to include RC pulse-jet aircraft, but it is necessary for the relevant State Association to approve both the model and the venue before the aircraft may be flown. Why? Sometimes our enthusiasm overcomes our prudence; an impartial scrutiny of the project can bring overlooked factors to light.

One of the persons affected by the requirement is the MAAA(Inc) President. He has a large pulse-jet, for which he paid a record price at the auction at the Richmond Nats, installed in a model that he is eager to get flying. You, too, may fly a pulse-jet RC model, but be prepared for some checks by your state before you do. Factors that could apply include possible fire danger, area affected by noise, pilot proficiency, number of spectators, and the venue. Pulse-jet models do not necessarily fly fast; they could well be slower than some pattern ships. Their main problem is noise: an RC model flown at 300 feet



Curtiss XP 40 Q2, the last of the P40 line, and outclassed by the Mustang. This model from a Top Flite P40 scale kit has 90° twist retracts, servo operated, and OS 61 FSR. From Nicholas Angove-Rogers, Sao Paulo, Brazil.

Entry Form

43rd AUSTRALIAN NATIONAL MODEL AIRCRAFT CHAMPIONSHIPS

30 DECEMBER 1989 - 6 JANUARY 1990

Treasurer : Brian Edwards 113 Herbert Road Shenton Park WA 6008 Phone (09) 381 9023

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3		FIC - Power	23		F2B - Aerobatics	43		Advanced Aerobatics
4		FIG	24		F2C - Team Race	44		Sportsman Aerobatics
5		FIH - A2 Glider	25		Goodyear Team Race	45		F3B - Glider
6		FIJ - Power	26		2.5 Rat Race *	46		Thermal Glider *
7		Open Power	27		Open Rat Race	47		F3C - Helicopter
8		Open RUbber *	28		Bendix Team Race	48		F3D - Pylon
9		P30 - Rubber	29		F2D - Combat	49		QM - Pylon
10		Day Scramble	30		Slow Combat *	50		1/2A Pylon
11		Night Scramble	31		Open Combat	51		F3E - Electric
12		HL Glider *	32		Sea Plane	52		7 Cell Electric
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.....

VH No Date of Birth (Jnr)

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NAME

ADDRESS

.....

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I agree to accept and be bound by the Rules as described in the MAAA Inc Aeromodels Official Rules and Instructions (1988) as amended at June 1989.
I also agree to render reasonable assistance in the running of events.

Signed

Date

Protect your right to fly model aeroplanes. Join an MAAA-affiliated club.

would probably be heard nearly two kilometres away. Another is fire hazard: the tailpipe glows red hot and would be capable of igniting dry grass if the model landed or crashed with the motor running or immediately after it had stopped. That hazard would have been non-existent at the MARCS field after the rain we have had this year.

Again may I point out that the Association is not trying to spoil your fun. What it is trying to do is protect the interests of its 6000+ members who stay within the mainstream of modelling. Our flying must not only **be safe,** but it must **be seen to be safe.** It takes a lot of hard work to counter just a little bit of bad publicity.

Rule Book. Most of the pages of Change 4 to the Rule Book are at the printers as I write this. Those that are not are being withheld until I can check my version of the rule changes with the Minutes of the CIAM Plenary Meeting, which are still to be received. Sections 4 and 4A of the 1989 version of the FAI Sporting Code (they make up Chapter 1) have been extensively revised, and will be issued complete, together with Section 4B, the rules for Space Models; now that the State Associations may affiliate space model clubs if they wish. There are over 170 pages involved in that part. Some of the decisions of the CIAM Conference last April change the text, with immediate effect, on about twenty pages of Sections 4 and 4A, so these will be replaced, and there will also be supplementary (green) pages issued to warn of changes effective in 1993. Just over 40 double-sided pages will be issued or replaced in Chapters 2 and 3 because of decisions at the last MAAA Competition Rules Conference and the new CIAM Provisional Rules. This section should not require revision again until 1993 because of a freeze of Australian Rules.

The FAI Rules part may be changed before 1993 to allow nose reduction measures to be introduced, and it is likely that more upplementary pages will be required after each Plenary Conference. The cost of the Change to those current Rule Book holders who asked to be sent future changes looks like being about $8.00. If you want to have your name taken off the mailing list for any reason and not just because of the cost, let me know now. If you did not pay for Change 3 (and your name by now has been deleted from the mailig list) and you want to change your mind, act quickly. A minimum quantity of Change 4 is being printed; less, in fact than the number of Rule Books out there, because hundreds of owners have not told me that they have a book and want it kept up to date. A final caution: at least one State Association has pruned its list of FAI Observers. If you have been dropped you will probably be asked to pay for Change 4. Again, if you do not want it, tell me soon.

Different Rules. Earlier this year the State Associations voted on whether to accept or reject a set of rules, including guidelines, put up by SAM Australia. One state rejected the proposal because of the guidelines, and another was counted as doing so because it recommended a change in wording on a clause about noise. (The vote was to accept or reject the complete rules as submitted, with only minor editorial changes to suit the Rule Book format being permitted.) The other states accepted the proposal, and the rules will be issued in Change 4. I note that a new SAM Chapter in Australia does not accept the guidelines, and presumably will not require that they be followed. Thus, a model acceptable in competitions run by that Chapter may not be acceptable in other Old Timer contests run in Australia.

It is fact that Old Timer competitions attract the most entries of any RC event at Nationals, with the possible exception of Thermal Glider occasionally. It would seem to be foolish to omit them from the Nationals programme, but if it is not possible to fly to common rules it may be necessary to do so. I know that I would not like to travel a thousand kilometres or so to find that my model was ruled ineligible for entry. I am glad that most rules are agreed internationally; for example AMPRA cannot change the F3D (RC Pylon) rules, although the MAAA has just agreed to determine the final points for that event differently, but with no consequent effect on model eligibility, race procedures or the end result.

RC Aerobatics National Average. Each year the Australian Pattern Association determines the National Average: a figure used to advance contestants in Sportsman, Advanced and Expert categories. The figure for 1989 is 480. If you want to know how the average works, it is described in the Rule Book. The 1989 MAAA Competition Rules Conference tasked the APA with determining the National Average, and, to enable it to do so, APA has asked the organisers of RC aerobatic competitions to use a standard format of score sheet, and to forward the results for analysis. There is no compulsion to do so, but I suspect that if results of a contest are not included in the analysis because they were not supplied, there would be fewer entries at that event the next year.

State Secretaries. By this time of the year the Annual General Meetings have been held and the office bearers of the State and Territory Associations elected. The Secretaries of the Associations are:

Model Aeronautical Association of Queensland (Inc);
Cec Bardell, PO Box 329, Morningside, 4170.

Radio Control Aircraft Society (NSW)
Ian Avery, 17 Kalang Road, Kiama, 2533.

ACT Aeromodellers Association;
Peter Smith, 3 Brewster Place, Duffy, 2609.

Victorian Model Aeronautical Association (Inc);
Ken Battersby, 40 Lee Anne St., Forest Hill, 3131.

Tasmanian Model Aeronautical Association (Inc);
David Howell, "Ciuan", RMB 5122, Plenty, 7140.

South Australian Associated Aeromodellers (Inc);
Laurie Middleton, 20 The Triangle, Warradale, 5046.

Aeromodellers West Australia (Inc);
Bill Fildes, 13 Carnegie Way, Padbury, 6025.

Northern Territory Model Aeronautical Association;
PO Box 4484, Darwin, 0801.

These people should be your first contact if you want details of clubs in your area. If you write to me, I will reply, but will also send a copy of your letter to the appropriate person for his attention. In other cases the first person to approach is your club secretary; he may be able to help you immediately. By the way, Southern Model Supplies, who market a wide range of kits, has undertaken to include in their RC kits the list of State and Territory Secretaries. Their in-



Sundancer and builder-pilot, Geoff Burfield. Engine is a Super Tigre 3000. Don Howie with camera. Red, orange and yellow trim on all white aircraft!



A Partenavia P68 with 2 x OS 25 FPs by Tom Cole, from a Marutaka kit. Photo by Don Howie, who reports that it is a great flying model. The pilot would have something to do with that!

Protect your right to fly model aeroplanes. Join an MAAA-affiliated club.



Junior, Craig Jones, starting his Pilot Tiger Moth at the Constellation club annual Scale Fly-In, May '89. No contest and lots of models. Howie photo.



Ralph Walsh with modified, electric powered, Trenton Terror. Powered by an Astro Cobalt 25. Pricerite kit, covered with red Solartex, weighs 2.6 kg. Photo at the Nowra rally by the columnist.

terest will, I hope, lead newcomers to seek us out. *A good move. Thanks to Southern Model Supplies. Who is going to follow suit?*

Telephone Lists. The name and address of the MAAA(Inc) are included in the Melbourne telephone directory and in several specialist handbooks such as the Pacific Aviation Yearbook and a Directory issued by the Australian Sports Commission. The result is that I receive calls from all over Australia on different aspects of model aircraft, and even other types of models. I had a call today asking if there was a club for collectors of model (dinky type) cars. Often the callers remark that they could find no mention of model aircraft clubs in their local directories. Perhaps your club could somehow negotiate an entry. Also, I believe that the AWA(Inc) has an occasional advertisment in the regional newspapers there. That could be worthwhile too.

The Nationals. The arrangements for the Bunbury Nats are proceeding, and there is an entry form and programmes elsewhere in this issue. It is just as hard to organise a Nats for 120 people as for 300. Reward the efforts of the organisers by attending the WA Nats. Remember that the West Australians have to travel over to the east four years out of every five to attend Nats. Surely the rest of us can make the effort one year out of five. Consider chartering a bus; there is plenty of room under the floor for model boxes.

1990 Scale World Championships. The next Scale World Champs will be held in Poland in August & September 1990. All three members of the Australian team will be selected on the results of the Bunbury Nats. Warwick Gregory, who gained a place by winning the last Nationals, is unable to take his place. I must submit a preliminary entry by mid-October. If you wish to go, either by gaining a team place or as a supporter, please let me know, preferably through your state secretary.

MAAA(Inc) Material. As well as the Rule Book, the Association has for sale to its members the Manual of Procedures (relevant to FF and RC flying displays, 'Big' models and model aircraft flying areas), an Instructors Manual and related log book (both based on the RCAS(NSW) publications and still bearing its logo), metal badges, cloth patches and waterslide transfer sheets. The latter has two large and two small transfers, one being a mirror image of the other. All are available through your state association.

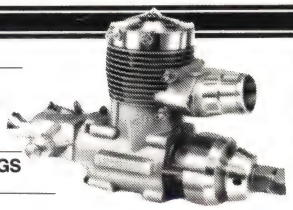
World Championships. Australia entered teams in the Free Flight World Championships held in Argentina last May. The team was full of praise for the organisation of the Championships; I have written to the Argentinians telling them so. The performance of Adrian Bryant in Wakefield was noteworthy: he failed by just four seconds to qualify for the fly-off; this after an absence from the contest scene of about thirty years. He spent some time before the Championships being coached by Paul van Leuven, who himself gained second place in Wakefield in the USA in 1979. Adrian also credits the helpers at the World Champs with finding the thermals. As usual there were some hard luck stories, but these are inseparable from World Championships. All in all the team performed creditably and, need I say it, represented us at their own expense. On your behalf I thank them.

As you read this the RC Aerobatics, Helicopter and Pylon Racing World Championships are under way. One team has a sponsor, the rest are parting with their own money in order to compete. I wish them excellent competition.

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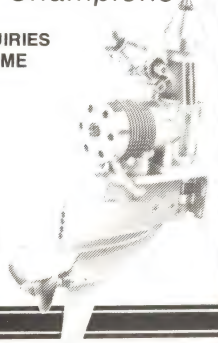
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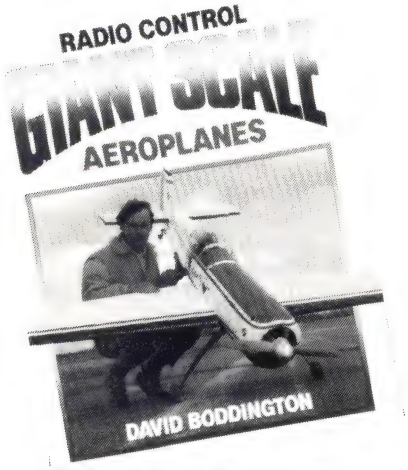
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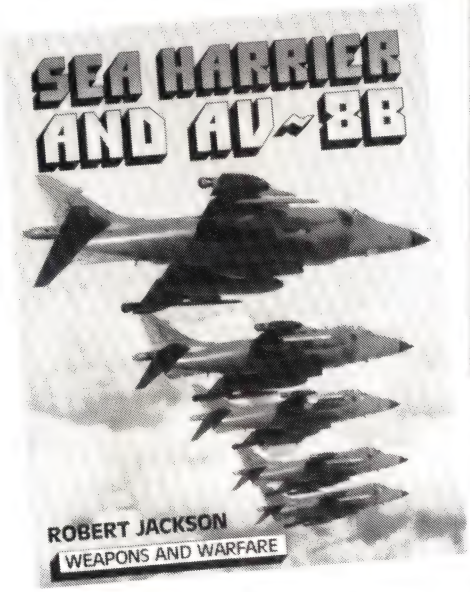
RC Giant Scale Aeroplanes
Published by Argus Books, Wolsley House, Hemel Hempstead, England.
Sold in Australia by Princeton Books, Mills St., Cheltenham, Vic., 3194.

Another from the prolific pen of Englishman, David Boddington, this soft covered, A4 size, 220 page book covers most aspects of this facet of the sport. The reader's attention is kept by the many photographs and good diagrams, and Boddington's eminently readable style.

It's all herez;from history to safety aspects; from construction to covering; chapters on linkages, rigging, undercarriages, RC installation and specialist guest authors on engines. I particularly liked the chapter on making true scale wheels using wax masters and silicone moulding techniques. The book focuses on other techniques applicable mainly to giant scale construction whilst not dwelling too long on the more familiar aspects of model building

This is a book for those with some modelling experience and a yearning to try something more ambitions. It's not for the neophyte, nor indeed for those long-standing modellers who have tasted the biggies. I doubt if the latter would learn much. But that still leaves a vast audience to whom this book is addressed and to whom it is recommended reading. Boddington admits to writing from a hotel room in Ibiza, which may account for the generally casual nature of the writing and occasional lack of direction, but this doesn't detract from the book's purpose, which it fulfils very well.

M.G.



Sea Harrier and AV8B by Robert Jackson.
Published by Blandford Press. Distributed by Capricorn Link, Sydney. RRP $37.95

Experiments with vertical take-off began soon after the second World War, and Rolls Royce developed the vectored thrust principle which enabled the Hawker Kestrel to be the successful progenitor of the Sea Harrier, which is being further developed in the USA as the AV8B.

Jackson traces the development of the power system and the aircraft, and describes the features of this very effective weapon platform in a very easy to read style. The use of special take-off and in-flight procedures are unique to this aircraft, and it has been thoroughly proven in war, enabling Britain to regain the Falkland Islands.

The book has 160 photographs and 1/72 scale line drawings of the Harrier family and armament variations, making it absorbing and informative reading.



RAAF Camouflage and Markings 1939 to 45; Volume 2, by Geoff Pentland.
Published by Kookaburra Publishing Pty. Ltd., P.O. Box 648, Dandenong, Vic., 3175.
R.R.P. $46, including postage.

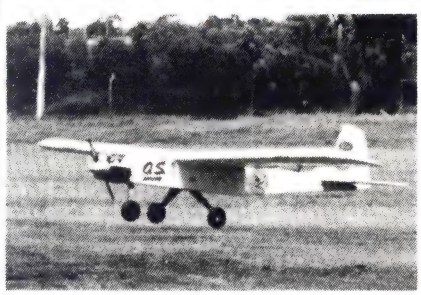
Of the many aircraft books that I have seen during many years of modelling, Kookaburra Books provide a bench mark for reference books about aircraft. This one, the second volume about aircraft that operated in the Australian region during WW2, maintains the high standard of production and intensely interesting material of Volume 1.

The photographs dominate the contents: most of them are excellent and informative as well as interesting. One of the most interesting features of the book is the number of aircraft nose decorations, many of which have been shown in detail by author Pentland. He has also given another superb selection of colour illustrations of aircraft that will gladden the hearts of scale modellers.

The text provides the background to the pictures: the acquisition, deployment and battle use of many of the aircraft shown in the book. It knits the contents together quite well, and also reveals a couple of significant discoveries, explained exclusively in this volume. It is remarkable that such valuable material has become available so long after the war. With the memory of the horror of conflict fading with the passage of time, this book brings out the visual qualities of the aircraft for our enjoyment.

M.B.

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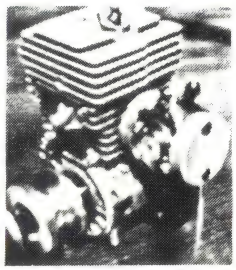


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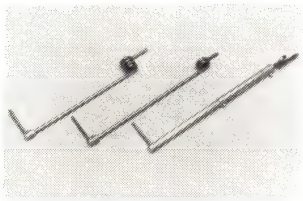


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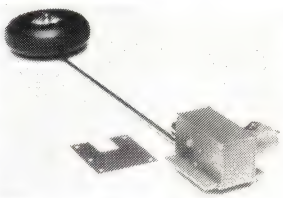
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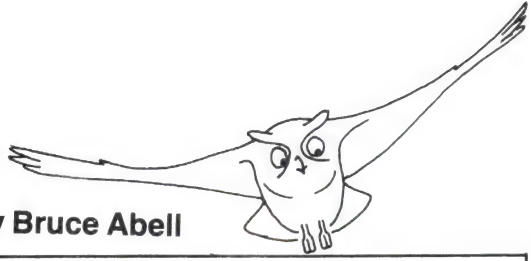
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ON SILENT WINGS



by Bruce Abell

COPING WITH STRESS

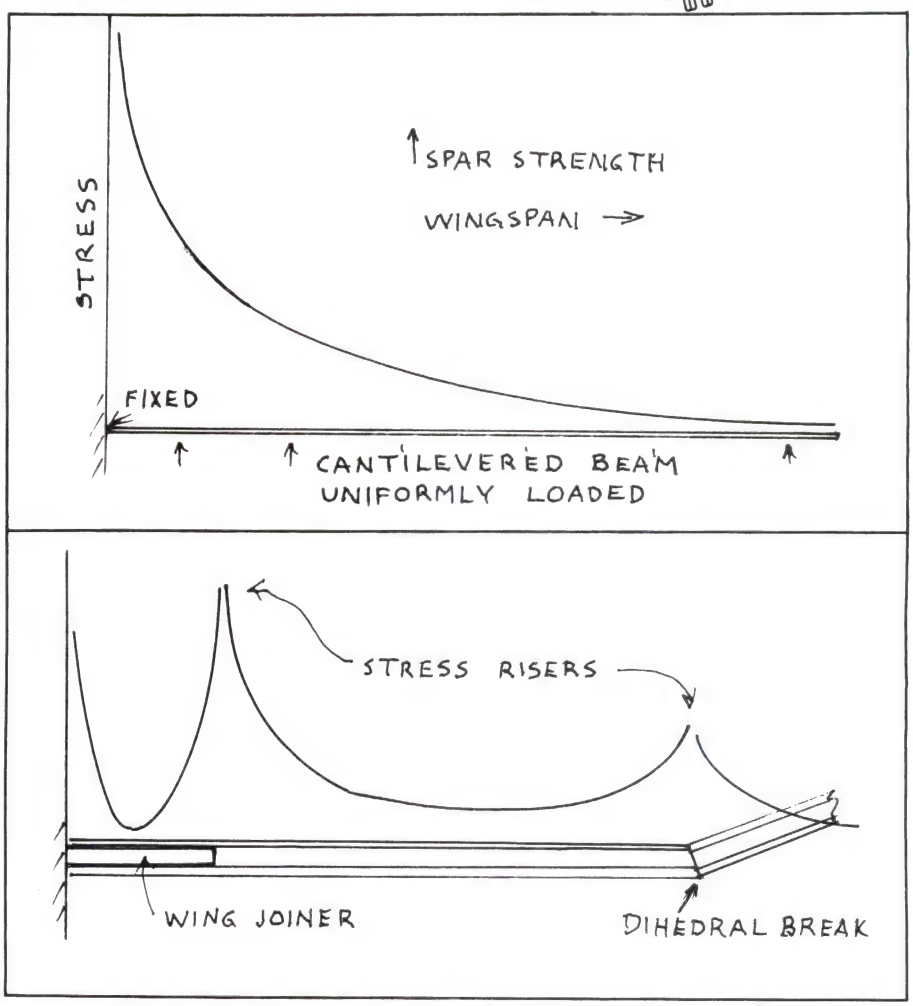
Many a model has been broken when flown in windy conditions, often at a contest, and usually after having been flown for some time on previous occasions in more gentle weather. It is very easy to misjudge how much launching stress a wing will take when the model has been flown only in calm conditions, without the pressure of competition, and has become a well-known, well-liked aircraft.

During all those launches the structure undergoes much flexing, particularly the wing, and the material may become weakened by the intermittent but repititious fine scale movement. Then, when the wind rises or becomes gusty, and the model must be used to stay in competition for a place in that contest, the structure can be suddenly overloaded and may fail, usually with disastrous results.

Failure usually occurs at places where the stress is concentrated, due to the structure, or due to a discontinuity in the material of that structure; for example, at the end of the wing joiners, particularly if the joiner is inside a metal tube. The metal to wood joint is a bad case of a stress riser. Similarly, stress risers occur where sheet covering ends or where balsa takes over from hard wood, or where spar s are joined.

To cope with the stresses in the wing, the strength must be matched as closely as possible to the stresses. The simplest case is to regard the wing as a single spar which is loaded as a cantilevered beam; that is, only one end is fixed; and the beam is to flex according to the load, or stress, placed upon it.

The stress distribution is non-linear, as shown in the diagram; therefore the strength of the spar should be the same. The wings of many light aircraft are regarded as a spar with an aerofoil-shaped envelope, that has no strength, wrapped around it. A more efficient structure can be produced by regarding the other spars (LE, TE and subsidiary spars) as load-carrying members,





Top trio at LSF '89: Peter Abell 5930, John Lawry 5870 and Graeme Garner 5852. The Queen's Birthday weekend provided a test of survival: Saturday was rained out after about one round; Sunday was almost blown out; and Monday was sunny and calm. Final scores were taken from 6 out of 7 rounds.

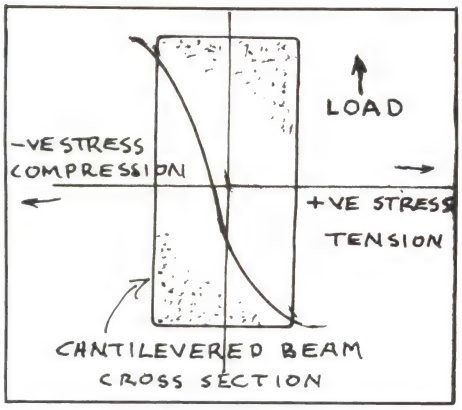


Winner of the Champions Fly-Off, in which all LSF winners from over the years fly against each other, was Rob Benton. Here Dave Meson competes with Rob for the floppiest hat!

and utilise them as such, by tying them together with a stiff wing skin, or with load-carrying ribs.

With a composite structure, particularly a framework covered with a fabric that has no significant strength of its own, it is more difficult to accommodate the stress pattern of the structure when under load, and stress risers may occur at different points.

The vertical stress distribution within the cantilevered beam puts the top in compression and the bottom in tension. This is true for a wing spar that takes the full depth of the wing section, and it means that the leading and trailing edges of a highly cambered (undercambered) wing are in tension rather than taking any compresssive loads. For a symmetrical section the forces are balanced, and remain so until the structure fails.



To overcome the disadvantages of an inadequate structure, several mechanical features may be used, either singly or in combination.

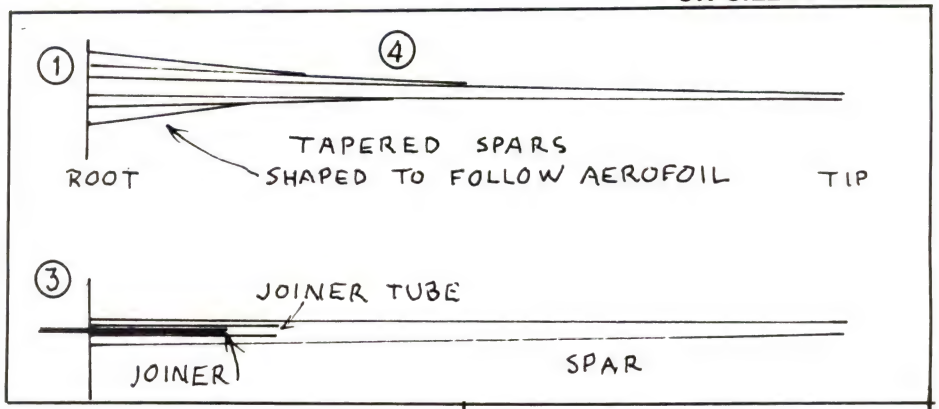
1. Taper spars.
2. Make top spars larger than bottom spars.
3. Make wing joiner tube longer than wing joiner.
4. Splice spars with 14:1 taper or scarf joint.
5. Transfer loads from LE and TE to main spar with ply ribs.
6. Taper dihedral braces.
7. Feather edges of re-inforcing laminates such as glass, carbon and kevlar cloths.

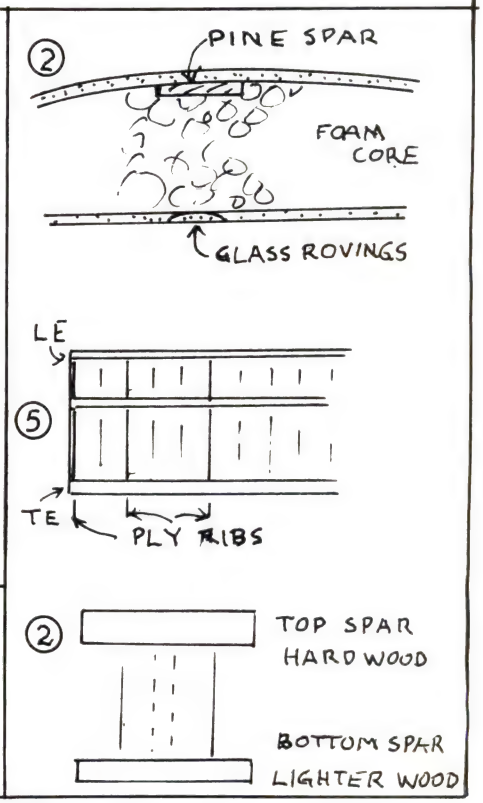
In essence, the strength of the wing should taper in a non-linear fashion so that there is no discontinuity in the structure where stress can be concentrated and cause structural failure. The result will also give lighter extremities that improve the stability and control responses of the aircraft. The limiting feature of this process is that the wing tip structure must be strong enough to withstand other stresses; those related to minor collisions, such as grass catching a wing tip at touchdown; not only the launching and in-flight aerodynamic loads.

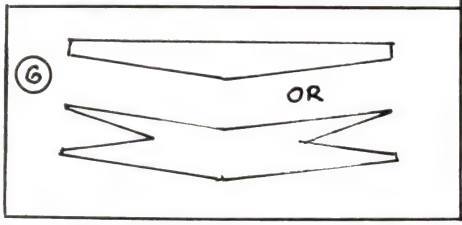
The same concept of stress may also be applied to some extent to fuselages, and even tailplanes. But it all means more work to produce the better aircraft.

RELATIVE STRENGTH TO WEIGHT RATIOS (Standard taken is balsa at 9 lb per cu ft)

Balsa	1.0
Spruce	1.0 (27 lb per cu ft)
E2 Glass	1.05
S2 Glass	1.33
Kevlar	3.82
Carbon	4.65
Boron	5.85
Aluminium	0.8









Winner of the AIRBORNE Trophy at the '89 LSF Tournament was Manny Stoupos, who came closest to a perfect score in *any* round. No-one could match him, and there was no fly-off. This year was the Centenary of local government for Jerilderie.



Top landing points scorer at the LSF Tournament was Ray Pike, repeating his success of last year. The area was turned into a quagmire by the rain and the prints of dozens of wellies. LSF President, Mal Pring, sorted out the prize winners after CD Dave Meson had conducted another trouble-free contest.



Andrew Benton was top junior at the LSF Tournament at Jerilderie for 1989. He was a little shy when receiving his trophy from the Mayor of Jerilderie.

ON SILENT WINGS

AEROFOIL REVIEW

A good glider has the ability to be flown slowly so that it can loiter in rising air to gain altitude, and it needs to be flown fast to get out of sinking air as quickly as possible. To get a reasonably wide speed envelope, the aerofoil of the wing has to provide high lift at low speed and low drag at high speed. To achieve this to any extent requires a compromise in choice of wing section.

With model gliders a great deal of testing has shown that high cambered aerofoils provide high lift at low speed and a high angle of attack, when the drag is reduced because of the low speed. Such aerofoils usually have a concave lower surface and produce a lot of drag at even moderate speeds.

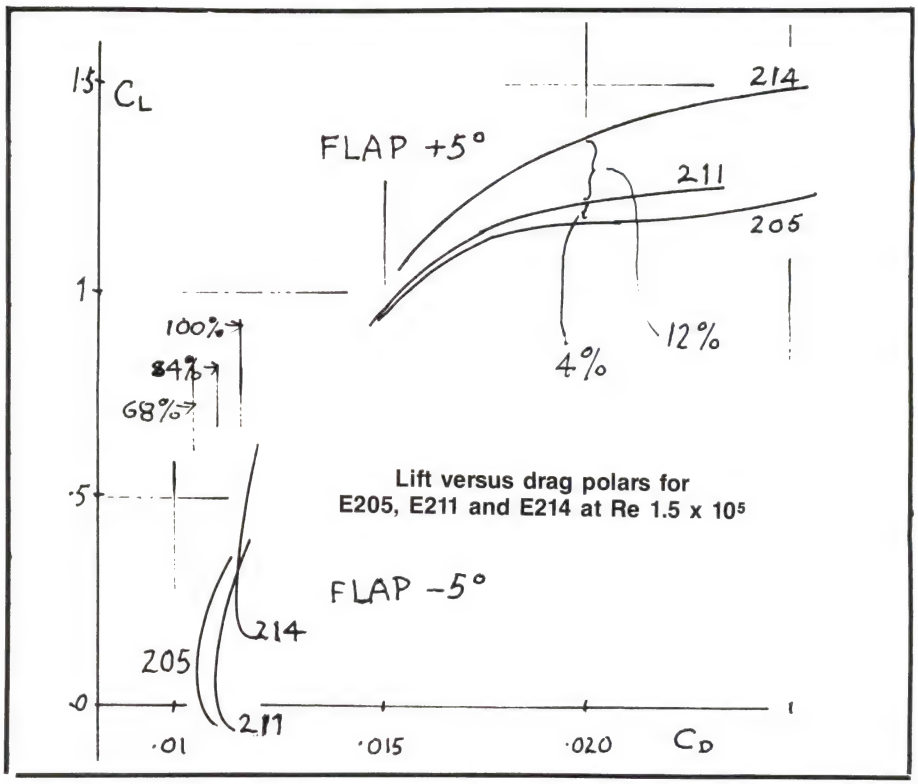
With a flat bottom the aerofoil produces much less drag, and less lift also, until the angle of attack is reduced so that turbulence on the undersurface produces a great deal of drag. If the camber is reduced further by making the bottom of the aerofoil convex, drag is greatly reduced over a wider range of angles of attack, and the lift is also reduced.

When such an aerofoil has a trailing edge flap added, drooping of the flap increases the lift for slow flight when the drag penalty is not great; and reflexing the flap reduces drag when speed is increased.

Experiments with this technique have been done with three popular Eppler aerofoils: 205, 211 and 214; at a Reynold's number of 150,000; which is 11 metres per second with a wing chord of 20 cm. The flaps were 20% of the wing chord of the test aerofoils, and deflection was limited to ±5° to minimise flow separation at the hinge line.

The results, published in Soartech, and repeated in Aspectivity for June 1989, show that E205 with *−5° flap has the lowesr* drag at speed; i.e. when the coefficient of lift is zero or close to it. E211 behaves similarly, but the drag is not reduced as much as with E205; while E214 has the drag reduced, but the coefficient of lift does not drop to zero. That is, E214 still produces lift at the minimum drag value with −5° flap.

At slow speeds E214 is markedly better with +5° flap, the lift coefficient rising steadily; while with E211 and E205 the lift coefficient plateaus off, the drag increasing without much gain in lift. The interpretation of the results at the low speed end of the experiment may be somewhat unreliable due to the formation of separation bubbles and other boundary layer effects.



Lift versus drag polars for E205, E211 and E214 at Re 1.5 x 10^5

The data are shown in diagrams for your own interpretation. It is important to avoid disruption of the airflow by the hinge line, and a sealed joint would be necessary to get worthwhile benefits.

GETTING LAUNCHED:
Make Your Own Bungee Reels and Parachutes from Scrap

by Neville Bothe

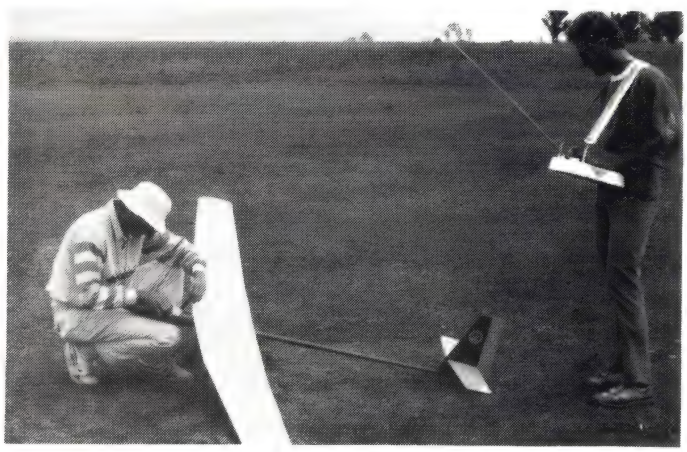
As a long-time, generally lone, modeller, the advantages of the Hi-Start launch were obvious, and after some experimentation with other materials, I soon invested in 31 metres of medium duty black surgical latex, costing $55 in 1982. In Issue No. 93 (OSW, Pp 74 & 75) Bruce Abell correctly refers to the need to separate the rubber and nylon line for storage. The first job that I tackled was the building of a two-stage reel which stored both components without the need for separation. I believe that I got it right frst time. It cost practically nothing, is simple, very convenient to use, and took only an hour to construct using domestic workshop tools. I give it most of the credit for the good condiion of my Hi-Start at 7 years of age.

From the local electrical contractor beg two empty 285 mm diameter tinplate cabel reels, one near perfect, 130 mm wide, for the basis of the reel, and the other with at least one perfect flange. Salvage this flange by collapsing and discarding its drum. Mark a radial line from the approximate centre to the outer edge and cut carefully, using a fine tooth hacksaw, so as not to stretch the metal or collapse the rolled edge. Deburr the cut edges with a fine file.

Because the anchor stake for the Hi-Start doubles as the winding pivot, it must be round in section and of metal. Mine is 9.5 mm steel rod with a spur welded near the top, similar to a tent peg. To do this job it should be at least 250 mm long; more if your ground is likely to be sandy or soft. Close the open ends of the reel with two 150 mm diameter galvanised flat steel discs,



The columnist's hand-held tow line: 175 metres of 20 kg. wt. BS nylon monofilament on a drum driven through a bench grinder gearbox. The line guide could be smaller. Note swivel, which is needed between winch and parachute.

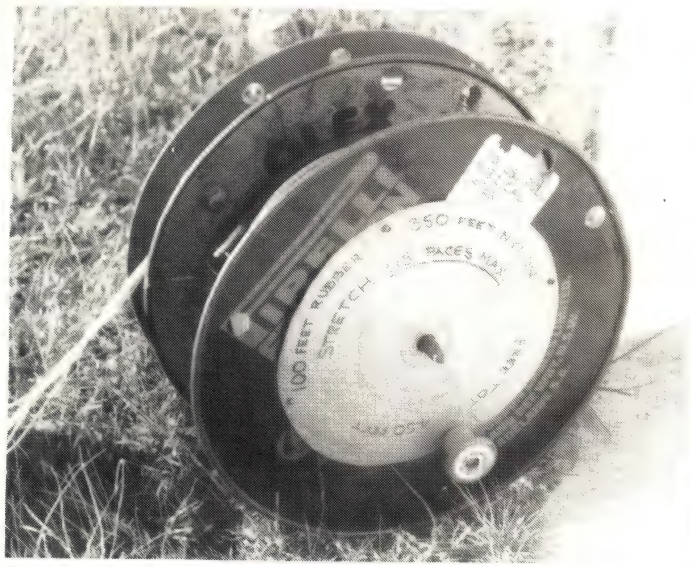


Garry Jordan adjusts his Foreign Order for pilot David Vels at the Armidale Expo. Span is 3.75 metres; area 93 sq dm; loading 33 gr per sq dm; aerofoil is RG 12. Rudder, elevator, ailerons and spoilers. Pic by the columnist.

centre-drilled to suit your peg, and blind rivetted to each flange at 90 degree intervals. Because the rubber will be wound on to the end of the drum which carries a large 20 mm hole, the opposite (plain) end will carry the nylon, so I leave one rivet out of this flange, and instead drill 5 mm for the crank.

On the outside of the crank flange scribe a circle of 110 mm radius (about 30 mm less than the reel radius) and divide this circle equally into eight points. Support the flange on the inside, and centre-punch each point lightly. Twist the split flange, and gently install over the drum with its unpainted (inner) face against that of the crank flange. Clamp together and scribe a mark across the edges. Support again and drill each punch-mark 3.2 mm through both flanges. Buff the paint off each flange around each hole.

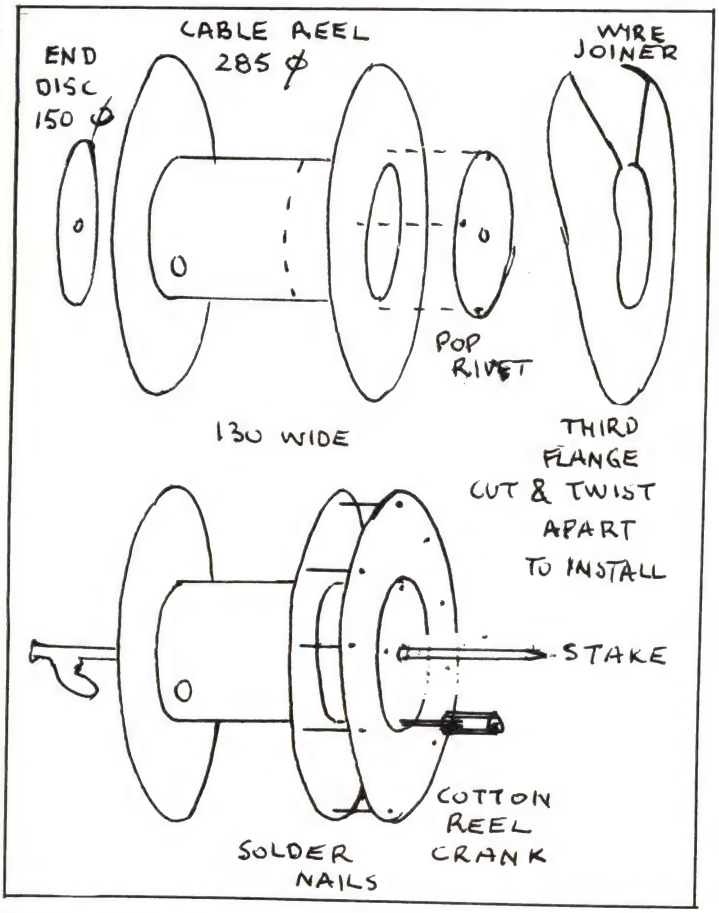
Switch on the soldering iron while you look for eight 12 gauge galvanised flat-head nails 50 mm long, and a 20 mm scrap of 10 gauge wire. Grind the points off the nails, leaving them each 45 mm long. Lie the reel down with the holey flange uppermost, drop a nail into each hole and sweat the heads to the flange. Join the outer edge of the split flange by sweating the short piece of wire into the rolled edge. Matching the edge-markings, locate the inner flange over the square ends of the projecting nails, and lightly peen their edges. Draw the inner flange out to the peened ends, heat and solder each end. Finally, square the inner flange on the drum and solder securely. Leave no sharp edges to cut the nylon or rubber.



Electric cable reel adapted for Hi-Start system. See diagrams for construction features. Photo by the designer.



Two designs by Ron Cooper; both perform well. Note large rudder on ITSA 2M. Similar style for SITA (Square Is The Answer!). Blue and yellow translucent iron-on film and white trim.





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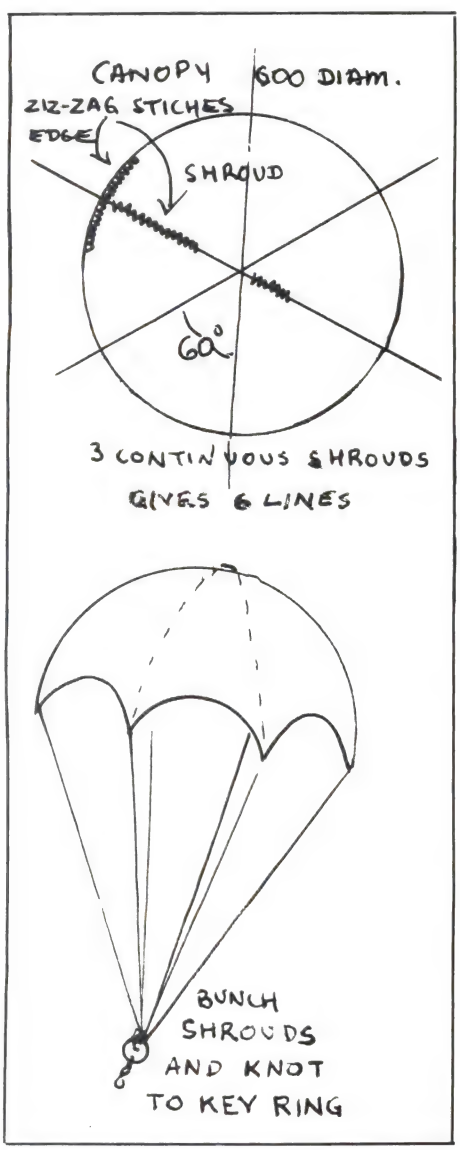
AB-1

Now you have a two-part reel with the small diameter for the rubber and the large for the nylon. Make up the crank from a 45 mm long, 5 mm bolt and a cotton reel sleeved internally with plastic or metal tube. Secure it through the remaining flange hole using a nut on each side and a lock washer.

The reel is used in this way:

To Wind On

I terminate my Hi-Start in a simple loop of heavy polished cotton cord. Wind the Hi-Start on to the reel by inserting this anchor loop into the hole in the drum, pick up the loop after sliding the anchor stake through the left centre hole, and continue out the right side. (Reverse the entire reel if left-handed.) Holding the stake horizontally in one hand, crank the reel with the other until the rubber is wound on, then run the line over the centre flange and continue to wind the nylon on to the larger diameter. Note that the difference in winding diameters prevents the line from loosening at the dividing flange. Avoid damaging the parachute and over-tensioning by advancing as you wind. The stake can now be removed. A heavy rag wrapped around the rubber will exclude light, extending the life of your investment. Store it in a cool place.



To Wind Off

Slip the stake through the centre of the reel, your hammer into your hip pocket, and advance into the wind paying out the nylon from the rotating reel with your free hand. Do not let it run off over the edge as a casting reel does, as this twists and tangles the line. As more line lies in the grass it will need less assistance until, as the rubber begins to run off, the reel will need to be braked until the anchorage loop slips out of the hole in the drum. Drive the stake, secure the Hi-Start using a lark's head knot, and leave the empty reel and hammer at the anchorage ready to pull up and rewind. If possible, aim for a relatively high anchorage point to cut down the drag of the rubber in the grass.

Joining & Terminating Hi-Start Rubber

I found that 6.5 mm OD metal tube, chamfered smoothly at the inserted end, would not creep off my 5 mm ID latex tubing even though the difference in diameter is only about 1.5 mm. The smaller size is also easier on the rubber, which is heavily stressed at this point. I don't think that many Hi-Starters would use connectors twice the diameter, as Bruce suggests. I use 19 mm key rings and 20 pound BS fishing swivels at each end of the rubber, another swivel below the parachute and a 25 mm key ring for towing.

Parachutes

I used a simple rag for a drogue for about two seasons, but was frequently troubled when releasing after a high launch by the rubber looping around the peg (or the barbed top wire of a fence, one of my favourite anchorages). A parachute dampens the release reaction, preventing this risk to your rubber and, as Bruce says, restores the combinaion to a good downwind lie. On a windy day there will even by some pre-load which makes for less walking and line-searching.

My first 'chute was of beautiful yellow poplin, visible but far too heavy. It would invert, stay neatly folded and beat the line down. My second effort was of teteron from an old shower curtain (the not-so-rotten upper part), 600 mm diameter, zig-zag stitched around the edges to prevent fraying, with three long shrouds of terylene builders' line zig-zagged to the canopy at 60° angles and leaving a 10 mm gap in the centre for the towing ring. This works every time and has lasted for five seasons.

Releasable Towhooks

Perhaps a good idea for competition work, but I have retrieved some very hairy launch situations without one, (I can be a very inept pilot at times). They are a needless complication in my particular situation, and certainly not mandatory when using a Hi-Start.

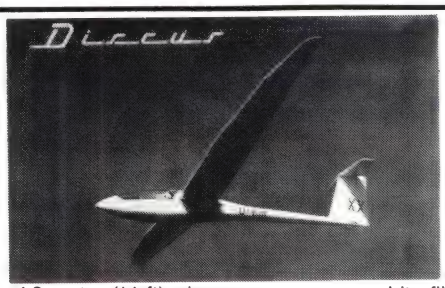


The double gang Hi-Start reel by Neville Bothe. Rubber tubing is neatly laid. Store without tension in a cool, dark place. Parachute may be left attached.

Finally

The convenience of a proven reel and parachute will allow you to obtain greater use from your Hi-Start investment. If you are a novice and contemplating a Hi-Start, don't be put off by Bruce's warning of 'unstoppable' launches. Any launch method requires commitment from the instant the model leaves your hand, and the Hi-Start is less violent than many winches. Neither let the high cost of the rubber worry you. If you build a reel such as mine, and look after the Hi-Start as Bruce suggests, the cost will be spread over many years.

The humble Hi-Start is the key to gliding on your own.



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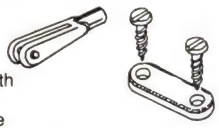
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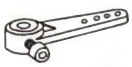
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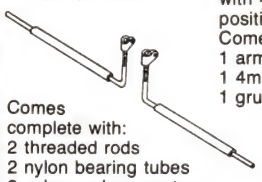


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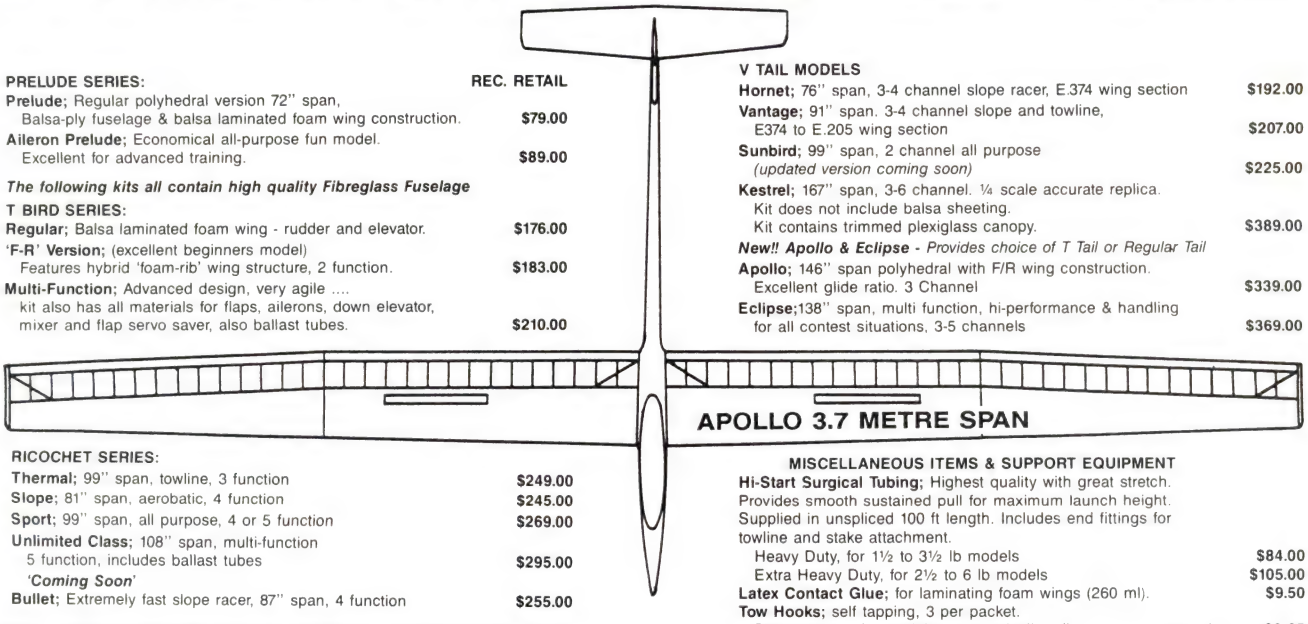


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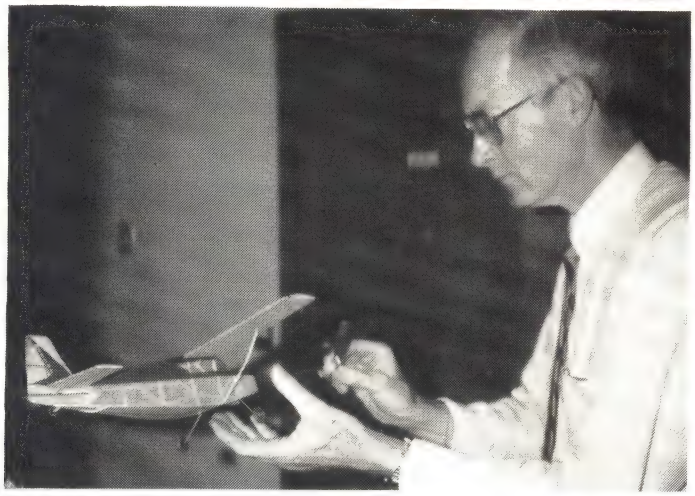
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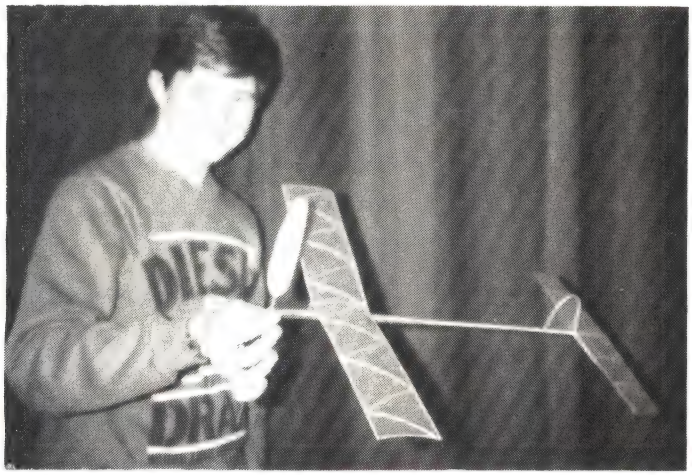
NEW ZEALAND NOTES



Angus Macdonald suspends his peanut Nesmith Cougar in mid-air (with ESP?) as he places the nose block. Craftmanship superb, flight excellent, says photographer Ackery.



John Poletti with High Ball by Pete Neate, Aeromodeller October 1947. This one with original Elfin 149 flys very nicely. Ackery photo.



Jason Magill with a nicely built Fly Rod, a Laurie Barr design that shows plenty of potential in Jason's hands. Indoors with Dave Ackery.



Terry Magee with a Mini Thermalist, half the size of the original from way back in Aeromodeller. Lump on the tailfin is DT fuse! Pic by Dave Ackery.



Another Fletcher, this one from Heenan plans to 1/6 scale. Weight is 5.2 kg, hauled around by an OS 61 and Futaba radio. Dulux finish. Drops ashes from its hopper! Photo: Cooksey.



The famous Super Chipmunk, this one by Brian Sheppard. GRP fuselage. Nice paint job. Weight is 3.86 kg all up, including JR radio using 4 functions. Cooksey camera work.

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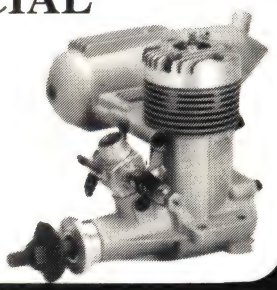
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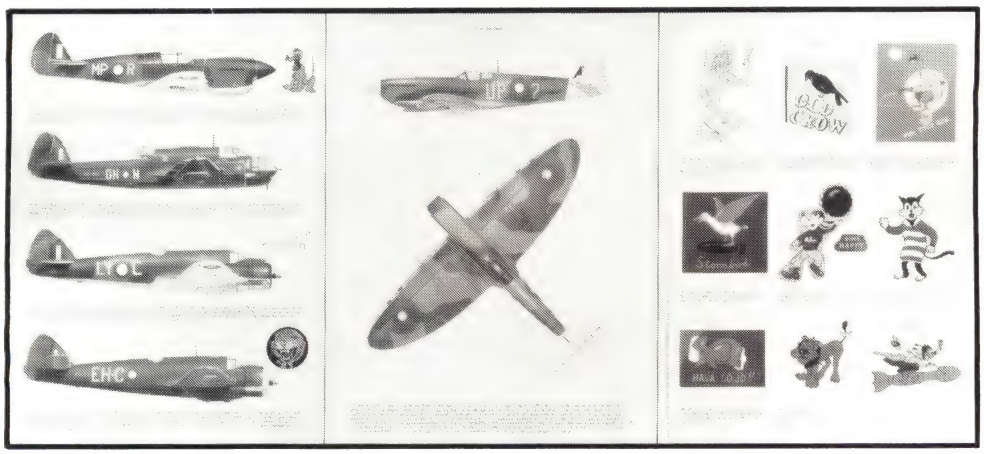
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Engine Review

MAGNUM 40

GP ABC RC

The Magnum engine line-up is composed of the GP sleeve-bearing engines and the Pro series ball-bearing engines.

The first thing that I noticed about the 40 GP was the close resemblance to many of the Japanese engines on the market today. The Chinese seem to be doing to the Japanese what the Japanese have been doing to others for many years: more or less duplicating a design, making improvements, and then selling the product at a lower cost.

Crankcase. This is a one-piece, aluminium, pressure die-casting, with removable back cover, and has been given a glass bead blast finish. The work on the case has been performed with the CNC machinery, which results in an excellent surface finish. All sharp edges had been either bevelled or deburred, showing that attention had been given to minor details. It is really surprising how many top-of-the-line, higher-priced engines do not have internal deburring of the crankcase. Although not a performance factor, it is, nevertheless, a nice cosmetic feature.

Crankshaft and Bearings. The one-piece, hardened steel crankshaft has been machined from bar stock rather than a forging or casting, and utilises a counter-balance of constant thickness, milled away on either side of the crank-pin for counter-weight action.

Piston, Sleeve and Rod. The Magnum 40 GP utilises Schnuerle scavenging with single transfer ports on either side of the divided exhaust. The high silicon content aluminium piston has been cast and connected to the connecting rod with a 5 mm diameter, hardened steel, tubular, wrist-pin that is, in turn, retained in the piston by wire snap rings. The connecting rod has been machined from aluminium plate and is bronze bushed at both the crank-pin and wrist-pin ends.

Cylinder Head. This is machined from an aluminium die-casting with a cast-in bronze insert for the glow plug threads - another nice feature.

Carburettor. This is of the two needle, rotating barrel, fuel metering type. Fuel metering is accomplished by a brass tube pressed into the steel barrel, and that extends halfway across the venturi and slips over a smaller diameter spray bar tube pressed into the aluminium body. The spray bar tube has a narrow tapering slot machined into it, parallel to the tube. Rotation of the barrel moves it in and out on the spray bar tube, increasing or decreasing the area of the tapered slot. This is a very simple but effective means of metering the fuel mixture. Idle adjustment is accomplished by the idle mixture needle, which has a screwdriver slot in the end. Two nice features of the carburettor are the collet type lock nut used to keep the idle speed adjustment screw from moving under vibration, and an O ring seal on the high speed needle. Many carburettor problems can be traced directly to leakage between the needle valve and the threaded portion of the spray bar. An O ring seal eliminates this problem. In actual operation the Magnum carburettor performance was excellent.

Performance. Following our standard 30 minute breaking-in and loosening up period, and using our standard 2-stroke test fuel, Magnum Spurt, the following figures were recorded:

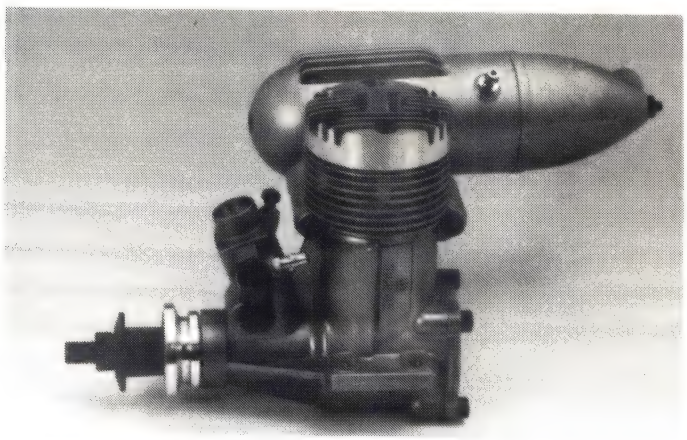
9 x 6	15,500 rpm
9 x 7	15,200 rpm
10 x 6	13,500 rpm
10 x 7	12,400 rpm
11 x 6	11,200 rpm

As the above figures indicate, the Magnum is a strong-running .40 displacement size engine.

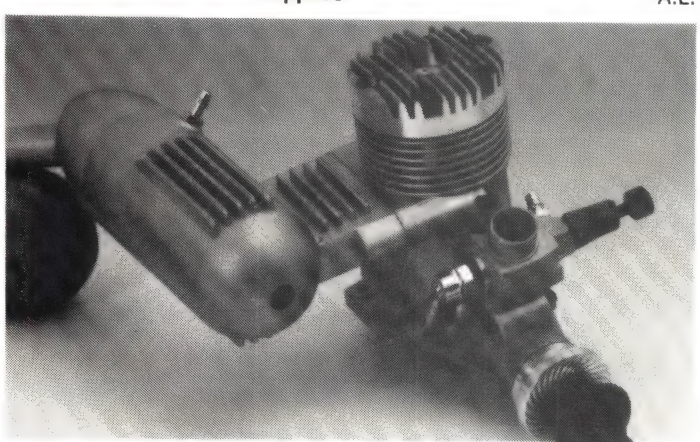
The overall handling was excellent, with no problems encountered during the testing. Cold starts were always one or two flips after choking and connecting the starting battery. Hot restarts were not always as fast, but presented no problems. The engine would hold a steady 2,350 rpm idle with the 10 x 6 prop, with good acceleration following a prolonged idle period, and would idle reliably at 2,000 rpm with the 11 x 6. A Richmond Factor of 5.6.

In summary, the magnum GP is a well-made engine of excellent quality; a real bargain for the price, and one of the better engine buys on the hobby market today.

Engine for review supplied by **Radio Control Supplies.** A.L.



Magnum 40GP has all the features of engines in its class. Performance and handling are very good.



Magnum 40GP showing bolt on muffler with angled exhaust outlet. Throttle is retained by servo clamp. Idle mixture needle adjusted with screw driver. Mounting lugs are embossed on top.

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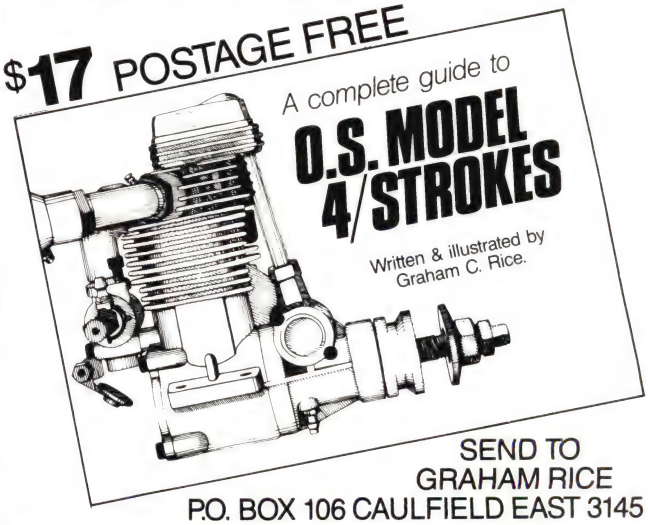
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FREE FLIGHT TOPICS

by Merv Buckmaster

WORLD CHAMPS RESULTS

The Argentenians conducted theior World Champs very competently. There were no problems on the field, while the accommodation and catering were very good too. The weather each day began calm and cold. The Soviet flyers used electric blankets to heat the motor tubes (with motors installed) of their Wakefield models. After a couple of calm rounds there were five thermally rounds, followed by falling temperatures and wind speed from mid afternoon. Fly-offs for F1B and F1C were postponed till day four due to impending darkness.

Our team's performance was highlighted by Adrian Bryant, who missed the 3½ minute max in the first round of F1B by only 4 seconds, and maxed in all subsequent rounds, while Vin Morgan dropped the last round in F1A.

The winning models were more advanced, more refined and better than ever before. The Soviet flyer who won F1C achieved the 8 minute max!

Results:

F1A; 73 flyers; 15 in fly-off

1.	Andres Lepp	USSR	*M + 240 + 300*
2.	T. Rojadiev	BUL	*M + 240 + 176*
3.	P. Sahi	FN	*M + 240 + 135*
8.	Mal Sexton	NZ	*M + 212*
25.	Vin Morgan	AUS	1214
37.	Bill McGarvey	NZ	1179
50.	Peter Nash	AUS	1125
61.	Ian Weston	NZ	1019
63.	Martin Williams	AUS	1001

F1B; 74 flyers; 8 in fly-off

1.	E. Cofalik	PL	*M + 240 + 300 + 317*
2.	A. Andrjukov	USSR	*M + 240 + 300 + 237*
3.	Reiner Hofsass	D	*M + 203*
11.	Adrian Bryant	AUS	1286
12.	Dave Ackery	NZ	1271
39.	Peter Smith	AUS	1190
43.	Bruno Chinchella	AUS	1155
53.	Alan McDonald	NZ	1087
62.	Colin Bruce	NZ	971

F1C; 48 flyers; 13 in fly-off

1.	S. Korban	USSR	*M + ⇨ 420 + 480*
2.	Randy Archer	USA	*M + ⇨ 420 + 250*
3.	Eugene Verbitski	WC	*M + ⇨ 374*
16.	Peter Nash	AUS	1296

Team Results:

F1A - USSR; F1B - China; F1C - USSR

A2 WINGS FROM FOAM

The very simple principle of having foam cored, composite skinned wings is explained briefly, with diagrams, in FFn 8906. The model is the F1A design of Jan Vosejpka, and has an aspect ratio of 13.9 for windy weather. The actual techniques have been described elsewhere, although the details have been chosen to suit this particular application. The wing so produced would be very resistant to abrasion, but it should not be long before repair techniques are also published somewhere. There's no doubt about it: hi-tech is beautiful!

NEW SCREWS

Prop screws for Cox TD 049 and 051s, that have a socket head instead of the slotted head, are available from:
James Bocckinfuso, 52 Jefferson Boulevarde, Pt. Jefferson Station, New York, 11776, USA; according to Bob Stalick, Model Builder No. 206.

A WARM TIP

By using an electric blanket to warm the motor tube and motor before winding for a flight at the Argentinian World Champs, the Soviet flyers have again focused attenion on the rubber rather than the gadgetry. Paul van Leuven has suggested using a wide-necked thermos flask filled with hot water to do the same job. The rubber is placed in a metal container which is immersed in the water for 15 to 20 minutes. The motor is then placed in the model and wound up. With this method Paul's FAI rubber will take 10% more turns at the same torque. He says that FAI rubber is 60% synthetic and heating gives extra stretch without harm. It is more than 15 years since Paul Lagan used to warm his next flight rubber motor by having it in a plastic bag and putting it in his trouser pocket.

FURTHER ADVANCES

The Dutch F1A flyers, Breeman and Somers, have, according to FFn 8907, produced a computer program to analyse and predict the performance of their models. The entire characteristics of the design are used; e.g. the layout, masses and drag coefficients of all the parts are all put in, and they have found that the easiest way to improve the glide is to increase the camber and decrease the thickness of the wing aerofoil. They are now trying 6.8% camber and 4% thickness, with a predicted duration, from 50 metres I assume, of close to four minutes.

These refined specifications have required new structures. The wing consists of a Rohacell foam core covered with 36 gram per square metre Kevlar epoxied on; and with carbon joiners instead of steel. The weight was 142 gram for the complete wing.

The whole story is amazing! Each development is startling in itself. Together, the best A2 is now beyond the reach of all but a very few of the flyers active at this time. This consequence of technical progress highlights a consequence of dropping the builder of the model rule in that, as Rod Lewis so cogently pointed out, our models should be regarded as sporting equipment used for competition purposes; and that, like equipment for other sports, should be available for purchase by competitors. It is to be hoped, for the sake of competition itself, that good models will soon be available, even if at a price.



Ben Lewis grinds on the turns while Lewis Senior monitors the work. Winding motors was a hot job at the Amberley Nats.

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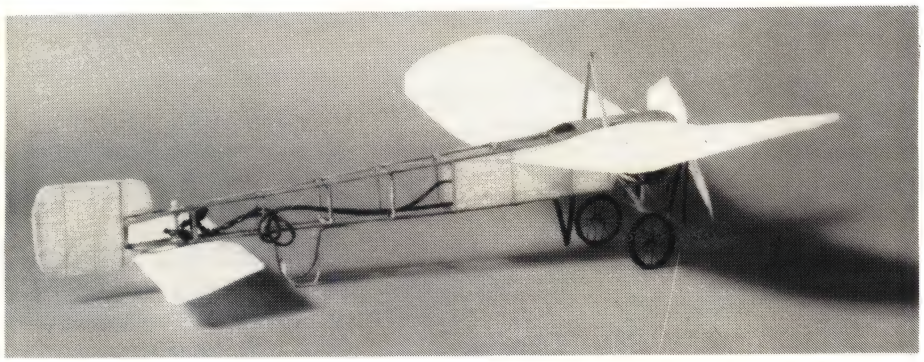
August 27th & September 3rd: Combined Mini State Champs and HLG

September 24th: Combined Open State Champs and Scramble

October 1st: Indoor

October 7th to 9th: SA State Champs at Bordertown

October 29th: Indoor.



A Peanut Bleriot 9 by Phil Stevenson. Of course it's not electric! That's the rubber motor; not battery leads! I wonder if Bleriot invented Drag.

MAXING MADE EASY

Paul van Leuven has done more work and trials with his F1B design since recovering from a very trying illness, and now claims that his Maxima 2 can fly longer than 4 minutes. The performance is based upon Frank Zaic's Circular Airflow theory, the trimming advantages of his chine design feature, and very careful trimming, using a right-left flight pattern.

Without VIT the looping tendency is controlled by the chine, which acts as a preplane providing a nose-down pitching force, since the rigging angles are intended to have the wing climb initially at 0°, cruise at 2° and glide at about 6° when the chine provides a nose-up force.

The wing structure is built up, as Paul found that the glide of a model with a D-box wing was poor, even with invigorators, and he claims that the self-turbulating effect of ribs and spars improves both glide and climb. A D-box structure should have the top sheeting to 60% of the wing chord, as on the MPA Daedalus, to retain laminar flow as far as possible. He says that this experiment needs to be done as yet, but the theory may hold in spite of the lower Reynolds number for the model.

The Maxima glides quite fast at about 2 metres per second, and has a tight glide turn. This is to keep the model in the thermal as well as to provide more lift from the greater airspeed. Differential tip wash-out into the turn ensures a steady transition from right turn under power to the left glide turn, and rolls the model into a bank that provides the extra centripetal force for the tighter turn. Bob White also uses this trim style.

Paul's flight trials support his ideas. The model climbs almost vertically for the burst, settles into a nose-up cruise after about 4 seconds, and at prop fold the nose drops into the glide attitude at a height of about 91 metres (measured by the angle 150 metres from the launch point) after a 50 second motor run. The glide was 193 seconds, giving a flight of 243 seconds, averaged over several flights.

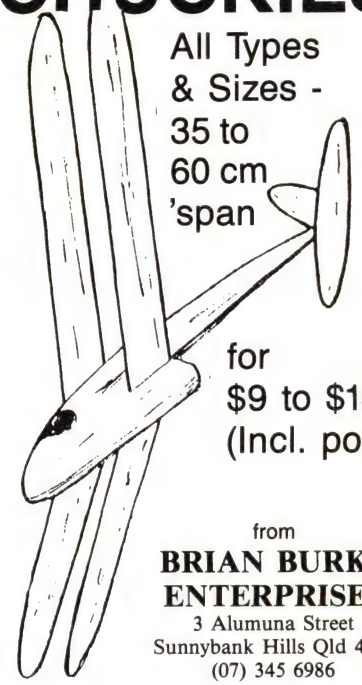
Paul uses 18 strands of 4.5 mm FAI rubber wound to 430 turns and 110 oz-inch of torque. He considers that many good models are capable of this performance if they have his essential features, are well made and painstakingly trimmed.

More details are in the August issue of Aeromodeller.

PROPOSED QUEENSLAND FREE FLIGHT CALENDAR FOR 1990

Jan. 26:	**State Champs F1J**
Feb. 18	**Combined % & HLG**
March 18:	**State Champs F1H**
April 22:	**Combined % & Stand Off Scale**
May 20:	**State Champs F1B**
June 17:	**State Champs F1G**
July 1:	**State Champs F1C**
July 22:	**State Champs F1A**
Aug. 19	**Combined % & HLG**
Sept. 16:	**Combined % & P30**
Oct. 21	**State Champs Indoor EZB & Peanut & Indoor HLG**
Nov. 18	**Combined % & Stand Off Scale & Vintage**

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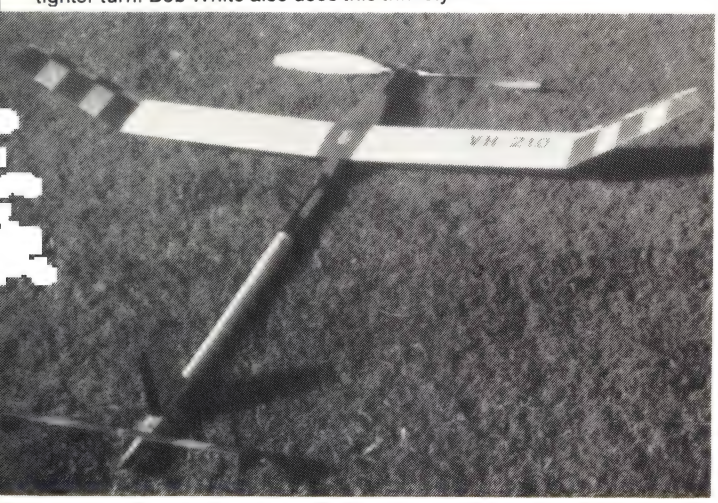
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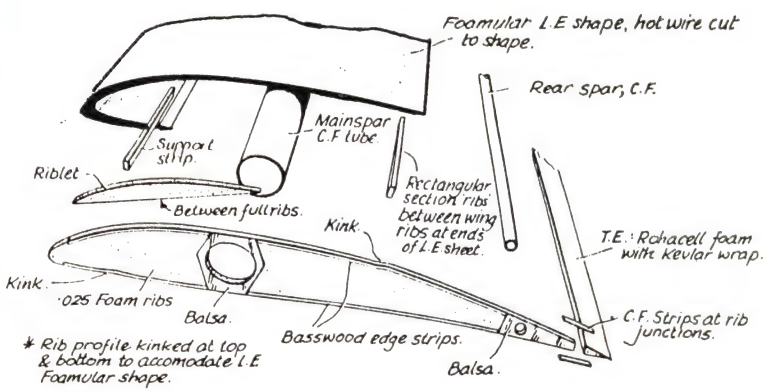
All outdoor events to be held at Wivenhoe. Enquiries to George Baynes, 21 Celadon Street, Sunnybank Hills, 4109.

ENTRY FORMS.....

.... and programs for the 1990 Free Flight South Pacific Champs and Trans Tasman contest are available from The Editor, RMB 1798, Benalla, Vic., 3673; and from Dave Thomas, 46 Rondelay Dve., Castle Hill, NSW, 2154.



Exemplary workmanship in this van Leuven F1B machine. Paul has been a modeller for quite a while, as indicated by his VH number. Wakefield is his favourite class. He was runner-up at the Taft World Championships.



CONTROL LINES

by Ivars & Maris Dislers

Ivars Dislers,
46 Elston St.,
Brooklyn Park, S.A., 5032

Experimentation is vital if we are to progress, so I have pleasure in presenting the pioneering work being done by Brian Burke in the field of electric powered control line, and of Andrew Robinson in measuring noise levels of current competition models. Scale from the Amberley Nats completes the troika of fine articles.

I hope readers of Control Lines have renewed their membership or intend to join an MAAA affiliated club with CL activity. There are clubs in each state, and a listing can be obtained from each state secretary (see MAAA News for addresses). Clubs offer the security of having MAAA insurance cover (accident liability) and direct involvement in the mainstream of activity. Readers looking for a good club to join in Adelaide can contact me.

Here are a few dates for your diary:

October 7th & 8th	SA CL State Champs SAIT Oval, The Levels
Dec. 30th to Jan. 6th	Australian Nationals Bunbury, WA
Dec. 28 to Jan. 3rd	New Zealand Nats Wigram, Christchurch
February 4th & 5th 1990	1st Pacific CL Champs Clareville, Carterton, New Zealand

ELECTRIC CONTROL LINE

(Article compiled from letters by Brian Burke.)

Dear Maris

It was a pleasure to make your acquaintance at Easter after having been an avid fan of Airborne, and particularly the Control Lines section for some years now. The battery powered model that I took to Melbourne is only our second (the first being heavier and even more CG critical). It is a modified **Mauler Sport 15** that I kit, also suitable for 2.5 cc slow combat, similar to that flown in NSW. Consequently, with proper fuel proofing, it is feasible to alternate electric and reciprocating power using the same model. The electric motor initially used in conjunction with the 7.2 Volt buggy pack was a Johnson, made in Hong Kong. This is equal to a Mabuchi 540, and costs between $15 and $20. After damaging a few in crashes, I have managed to get them all working again by clamping the shaft in a vice and applying brute force. In fact, the engine in the Melbourne model was recycled in this way. By way of comparison, replacing a crash-damaged needle-spraybar assembly and glo plug costs about the same as a replacement standard Johnson.

The model is not far from performing a loop in its standard configuration, and since Melbourne I have looped, flown inverted (and recovered) and performed lazy eights using a modified Johnson motor. At this stage I can't envisage or contemplate an electric precision aerobatic model. In any case, how many fun flyers worry about vertical and overhead manoeuvres?

At the beginning I saw three directions that electric models could take in pursuit of better performance, namely: gearbox and larger prop; hotter motors; 8.4 V or higher; or a combination of all three. I have just tried a Model Flight gearbox employing 2.3:1 reduction in conjunction with an 8 x 6 prop, which produced best performance but, possibly due to internal friction, flying performance was unchanged, whilst take-off run was increased and acceleration was reduced. I intend trying an 8.4 V pack; however, I would rather not have to rely on this size because more people have 7.2 V packs. In this way any buggy owner can be introduced to control line flying for the price of a model, prop adaptor ad lines. I have obtained a Blue Bird Pro Series 704B ($50 retail) which is ball raced, torque wound and has adjustable timing. So far I have been disappointed in that I don't feel that it is as good as the home modified Johnson. I am awaiting fine weather to try some different setting which seem better in bench testing.

Tweaking the Standard Johnson

All that I did was close up the magnets and advance the timing. I am satisfied that I can now offer a viable electric package, and will modify or supply modified 540s for around twice the retail price. The biggest job is opening up the 'can', so if anyone can put me onto a quick method I will be able to knock a bit off my price. It now seems to turn a 7 x 6 at about the same speed as a 7 x 4.

To finish I would like to offer the following hints regarding electric control line models and flying:

1. Models fly so much more slowly that, even with a good design, balance point is critical to avoid stalling when flying directly upwind.
2. Battery packs can weigh as much as the model, and location obviously affects balance, both longitudinally and laterally.
3. Gravity overcomes centrifugal force much earlier and more quickly than with lighter and faster so-called normal models.
4. Kinetic energy is equal to a model half the weight and twice as fast. Lines, connectors, controls and so on should be up to the job and onlookers kept at bay.
5. Onlookers, and other modellers not exposed to the wonders of electric flight, had a highly excited team racer try to catch one of my first landings.
6. Power to weight is viable, but not directly comparable with reciprocation power. Flights are available every 15 to 20 minutes if recharging from a car battery, or with spare battery packs one can fly almost continuously. Fuel costs nothing, but good connections and correct gauge wire are essential. Starting is first flick.
7. I do not believe that timers and fuses are necessary, as power on landings overcomes the problem of a heavily loaded glide.
8. Electric power is quiet and clean in comparison with other power sources.
9. Electric power models may be flown locally, thus saving travelling costs.
10. Models can be made convertible from electric to glo-diesel power.

Suitable Kits and Motors

Send a business size, self addressed, stamped envelope to:



In Dad's footsteps. Ray Ogle's son holding the Clipper Cub entered in CL scale at Amberley Nats. Photo from the columnist.



Frank Sutherland was second in CL Stand-Off Scale at the Queensland Nats with his Eindecker replica. Simple lines, simple paint job and success is close. Dislers photo.



John Jamieson; AG Zero; CL scale at the Amberley Nats; first place. Another simple aircraft, modelled to a very high standard, and presented well. Dislers pic.

Brian Burke Enterprises, 3 Alumuna Street, Sunnybank Hills, Qld., 4109.
(Columnists comment. I observed a friend attempt Brian's modifications. We had no luck at all in trying to straighten out the bent-over tags that lock the end in, and had to resort to grinding them away with a Dremel using a carbide cutter. After closing up the magnets and re-assembling our motor, it ran backwards! After opening up the magnets a touch we were able to duplicate the performance gain that Brian obtains. Tacho readings with a 7 x 6 didn't quite come up to the previous 7 x 4 level, but there was a very useful rpm gain on Tornado 7x6, Taipan 7 x 6 and Taipan 7 x 4 props. On the motor we modified the end was a tight fit in the can, so after modification no means of locking it in place was used other than friction.)

SCALE — AMBERLEY NATS

Report by Merv Cox; Photos by Merv Cox, Wayne Andrew and Tony Bennet

Dawn, Wednesday 4th Jan. 1989. Scale Day at Amberley Air Base, and the temperature already about 24°C. Contestants doing last minute preparations for static judging; the contest director hibernating with his rules book.

1400 hours: Contestants gathered at the glider hangar for static judging; two judges short and no score sheets.

1500 hours: All set to go, and a very fine array of models presented for judging. The judges were very critical, and with 6 entries in Stand-Off and 5 in FAI, this process took more than 3 hours to complete. Considering the soaring heat, thanks must go to the contestants for their patience and co-operation.

Thursday. All contestants were ready and eager to fly on Thursday. We saw some beautiful flying in Stand Off, with John Jamieson's A6M3 Zero taking to the air right on time, followed by Max Newnham's Mustang, Frank Sunderland's Eindecker, Ray Ogle's Cub, Bob Seeney's Shoestring and Toni Jamieson's SE5A. Many fine manoeuvres were executed throughout the rounds; all aircraft performing exquisitely, although Max's undercart gave problems and Bob's Shoestring (sure looks like a Cosmic Wind in the photo? ID) kissed the tarmac and found it to be very unforgiving.

FAI Scale was even more exciting, with Max Newnham's Lancaster drumming up a song and doing every command perfectly. John Jamieson's FD7 was a picture, especially the landings and taxi runs with mostly 25 degrees ground bank. How did he keep his line tension? Toni Jamieson cast her fate to the wind, and her SE5A model as well. We all witnessed a fantastic display of machine against wind. The SE5A won the battle, but not without Toni wisely opting out of the second round. Wal Schuback put on a wonderful display, with his Yak 18 demonstrating its capabilities to the full. Congratulations to contestants and administrative staff for making the Nats 89 Scale event one to remember.

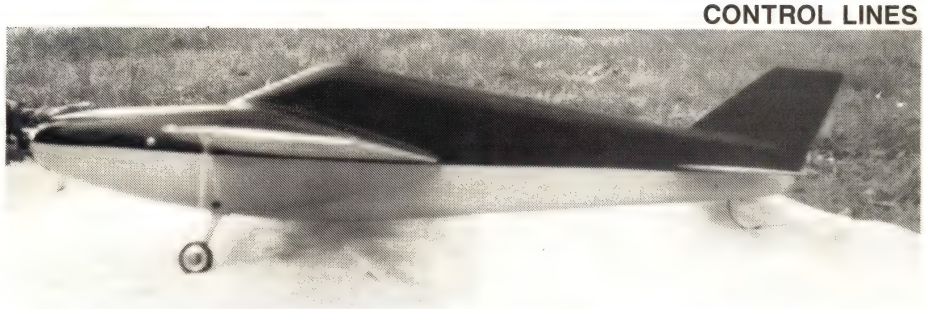
Results:

Stand Off

J. Jamieson	A6M3 Zero	3157.25 pts
F. Sunderland	Eindecker	3042.25 pts
M. Newnham	P51D Mustang	3027.00

FAI Scale

M. Newnham	Lancaster	3390.25 pts
W. Schubach	Yak 18	3267.75 pts
J. Jamieson	Focker D7	2961.75



A side view of the new Goodyear team racer by Alistair Boys and Robert Bolton. The design is a Polecat, 3-view published in Aeromodeller, November 1988. Photo by Andrew Robinson.

CONTROL LINE MODEL NOISE LEVELS

by Andrew Robinson

Noise level tests were conducted at the New Plymouth (NZ) control line site on Sunday 21st May 1989 due to the current FAI proposal of a 96 dBA noise limit effective in 1991. The weather was very good for the time of year: fine and calm, with almost no wind. The tests were conducted between 1300 and 1700 hours. The sound meter used was a Cirrus Research Ltd CRL 2.35A' (IEC 651), with both A Scale and Linear Scale readings. Tests were conducted using the fast mode with either the normal or hold model for peak readings. (NOTE: Hold peak appeared to hold a higher reading than Normal mode.) While a model was running on the ground, parallel to the surface, readings were taken right around the model, with not much change, so readings were finally taken in one spot, as per the diagram.

All tests were conducted in the same manner and position for ground runs and in-air tests. The position was one particular pitting segment, closest to the clubhouse entry, with the models parallel to the ground and within 3 inches of the ground or on the ground itself. Ground surface was concrete. (NOTE: Some F2A ground runs were taken at a different segment.) The in-air noise tests were between the two pitting segments closest to the clubhouse, standing on the FAI Team Race flight line, 1 metre above the ground.

These tests appear to indicated that all the classes tested, except F2C Team Race, have a noise problem. These tests should be repeated at differnt times of the year and also at different sites to confirm the actual noise levels.

NEW RECORDS SET IN NEW ZEALAND

Report from Andrew Robinson

On Sunday 4th June three New Zealand junior record times were broken. Alistair Boys and Robert Bolton (both juniors) did 3 minutes 55.8 seconds in a ½A Team Race heat (old record 5:07.4). This time is only 1 second outside Alan Barnes' NZ Open record, and it is the second fastest time in New Zealand. Airspeed 22.2 sec/km; 100 laps on 14.47 metre lines. This is equivalent to about a 3:28 time with Australian rules, and that is not hanging about! In Goodyear Team Race they broke the heat record with 4:05.0 (old record 4:24.5). Alistair and Robert also broke the Goodyear junior final time with 10:16.8 (old record 11:24.0), but were unable to claim it as the other team crashed at 112 laps. This made the race invalid for record purposes. Model was a Polecat; engine a Nelson 15 glow front induction. (See photos.)

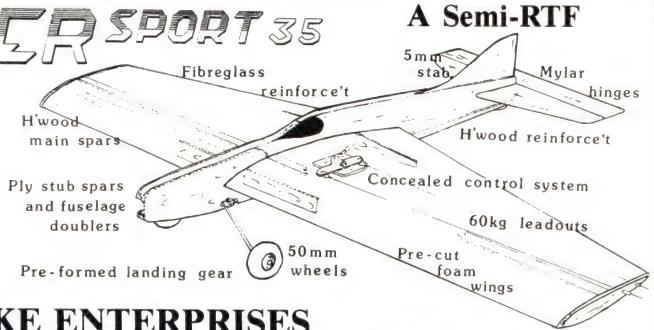


Stan Pilgrim, another engine whizz, was first in Midge Speed at the Hunter Valley Champs at 92 mph (vintage speed units!). Photo: Geoff Hungerford.

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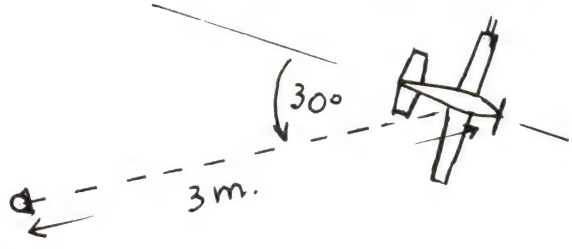


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Location of Sound Level Meter for noise tests.



Plan view of the Boys-Bolton Polecat. Engine is a Nelson 15 Glo, front induction, rear exhaust. To be leaders of the pack seems to be the intention! Another photo from Andrew R.

Results

GOODYEAR TEAM RACE

R. Brown & R. Boys model. Open rear exhaust OS 21 Glow F1, Taipan 7 x 6.
Ground run: AVERAGE: 105 dBA
PEAK: 107 dBA
In-Air Test, Solo: AVERAGE: 104 dBA

A. Boys & R. Bolton model. Open rear exhaust N 15 Glow F1, Taipan 7 x 4.
Ground run: AVERAGE: 103 dBA
PEAK: 105 dBA
In-Air Test, Solo: AVERAGE: 102 dBA

R. Brown & R. Boys and A. Boys & R. Bolton In-Air Test racing 2-up.
PEAK: 103-104 dBA

With both racing the peak was the Brown-Boys model, even though the Boys-Bolton model gave the impression of being the noisier in the air. Possibly due to having a higher rpm, the Brown-Boys model gave the highest peak noise on both the A scale and the Linear scale.

F2A SPEED

A. Barnes' No. 2 model with AB 15 motor, 76 mm radius x 5.6 inch pitch single blade carbon prop and a 4.4 mm diameter stinger.
Ground run: PEAK: 105 dBA
(NOTE: Noise level before on the pipe.)
AVERAGE: 95-96 dBA
In-Air Test: PEAK: 105 dBA
Time = 15.60 sec/km
PEAK: 105 dBA
Time = 15.03 sec/km

CLASS 2 SPEED

A. Barnes' Pink Lady model with Rossi 21 and 2 blade prop.
Ground run: PEAK: 103 dBA
In-Air Test: PEAK: 102 dBA
Time = 14.16 sec/km

FAI TEAM RACE

R. Brown & R. Boys' flying wing model. Rear exhaust Nelson 15D AAC, advanced timed liner. Russian style carbon prop, 155 mm x 7.2 inch.
Ground run: PEAK: 98 dBA

A. Robinson & D. Robinson's old conventional model. Rear exhaust Nelson 15D AAC, standard timed liner. FMV style glass-carbon prop.
Ground run: PEAK: 94-95 dBA
In-Air Test: PEAK: 93 dBA
Time = 21.5 sec/km

D. Bolton & R. Bolton's flying wing model. Rear exhaust Nelson 15D AAC, advanced timed liner.
Ground run: PEAK 97-98 dBA
In-Air Test, Solo: PEAK: 97-98 dBA
Time = 20.8 sec/km

Robinson team and Bolton team In-Air test racing 2 up.
PEAK: 97-98dBA

The Bolton team was the louder, and with two in the air there appeared to be no increase in the noise level. Also, a standard timed liner may give a lower noise level than an advanced timed liner due to lower rpm.



Alan Barnes and his Super Kingfisher, centrifugal switch pressure model after official flying had finished at the NZ TT team trials. He did a fantastic 13.51 seconds per 10 laps (266.5 kph). This is 0.7 seconds under the New Zealand record, but couldn't be claimed because there was no pylon available.

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Wind and Water

by Iain Kirley

Racing was very tight during the South Australian RM Titles. I would not like to be sailing one of the windward yachts here, as visibility is not good! Glen Pascoe photo.

This is my first column for Airborne on Yachting, and firstly I wish to thank Norm Skeen for all his efforts to assist our sport of model yachting. I consider that I am in the same class as Norm, in that I am also a Sunday afternoon skipper. There are many skippers more competent that I, but I will continue to sail and hope that you will also continue to support our favourite recreation.

CONTRIBUTIONS HELP

So, if you have a tip on how to set up a boat, make a fitting, or news of a coming event that is out of the ordinary, then tell me the information and I will pass it on. If you have photographs of events or new boats or equipment that you think are suitable for inclusion, then forward them to me please. My address is:

RMB 431, Macks Reef Road, Via Bungendore, NSW, 2621; phone: (062) 36 9304.

NATIONALS - CANBERRA JANUARY 1990

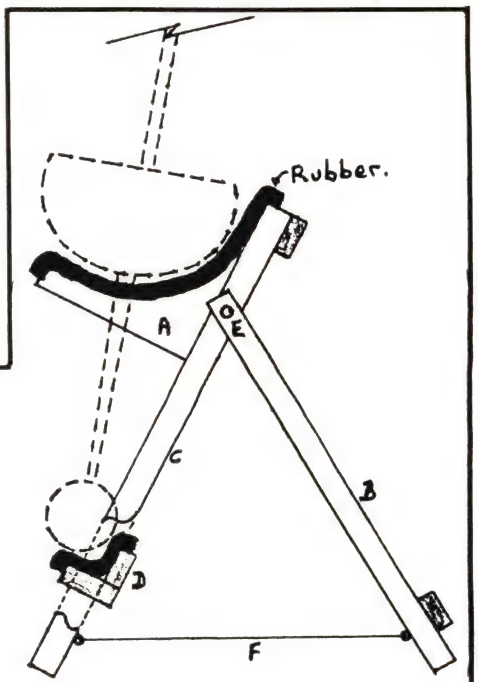
For all those who will be competing at the Nationals, Entry Forms and Sailing Instructions have been forwarded to the State Secretaries. If you need any further information contact the Race Director, Paul McGilvray, on (062) 91 7582; or me.

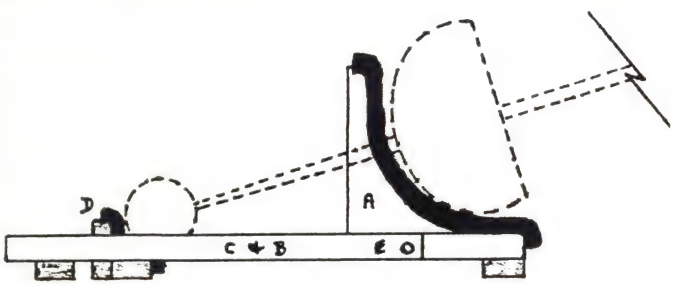
TIPS OF THE TIMES

This issue I have two tips for skippers. One is a collapsable boat stand, and the other is a method to prevent corrosion in RC wiring harnesses.

1. The Boat Stand was designed a number of years ago by Dave Burns to accommodate his Marblehead class yacht in either the upright or horizontal position. It is also possible to adapt the stand for 10 Raters. The diagram is self explanatory, with the only problems for the builder being the transfer of the hull shape to the timber and the calculation of the length of the keel lead.

2. Corrosion Protection. As we all know, at some stage all RC boats suffer from ingress of water, irrespective of how well they are sealed. I have noticed that after sailing in salt water the servo connectors suffer corrosion. In order to prevent this I now lubricate the connections with vaseline. This forms a barrier between the connectors and the unwanted water. This is not a total cure but it is another measure to reduce a possible problem. Pressure between the metal to metal contact should push the vaseline aside. Check the connections before launching though!





STAND OPERATION

Mode 1. Stand upright - legs B extended to limit of strings F.
Keel bulb suspended between support D and legs B.
- bulb weight unsupported - mast vertical.

Mode 2 Stand upright - legs B extended to limit of strings F.
Keel bulb weight carried by support D - mast more parallel to legs C
(roughly a heeled sailing angle).

Mode 3 Stand laid down with legs B folded over frame C
- whole frame lying on ground.
Keel bulb weight carried by support D
- mast almost parallel to ground.

LEGEND

A Chipboard hull support, shaped to match the hull of the largest (or beamiest) yacht to be supported.
B Adjustable legs;
a. Opened to limit of string F - stand in upright position (Modes 1 & 2)
b. Folded over frame C - stand in collapsed position (Mode 3)
C Main frame legs, which carry hull supports A, and bulb support, D
D Bulb support. Distance between A & D is arranged so that the bulb weight is carried by D, not by suspension of hull over A.
Pad with resilient foam.
E Pivot bolts for legs B.
F String to fix maximum extension of legs B.



Presentation of the Monaro Cup: Dave Burns, Paul Littledyke and Rob Guyatt. Next Challenge in Riverland in the middle of next year.

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CHECKLIST FOR CURRENTLY REGISTERED BOATS. Simple Points that are Essential to Good Sailing.

- are the fittings still operational? Make certain that there is no binding or damage to rigging.
- check the radio gear to make certain that it all works and that there are no broken leads and no corrosion.
- check the batteries to make certain that they hold a full charge and that there is no corrosion at the terminals.
- does the boat still measure in accordance with the registration certificate?
- is the certificate still valid?
- have the sails been damaged or stretched out of shape?

Other items may be added, but the above points are key elements to being a successful yachtsman.

PROJECT 'A'

With the Nationals only a few months off, now is the time to prepare a new boat, or service your current boat or boats. I have recently been sailing a lightweight A Class boat, but it has had a couple of minor problems so I have decided to build a new boat for the Nationals. I intend to use this boat as the basis of a project to show the methods used in constructing an up-to-date A.

The design that I have settled in is the Frank Russell designed **Alien,** which weighs about 28 pounds. In the past the A Class has been considered a heavy boat, usually in the 50 to 60 pound range, and very difficult to transport. The Alien, however, looks like a stretched Marblehead Class yacht.

In the past I have used Australian made products whenever they were available, which was not very often. However, in the last few years a number of yachtsmen have started to manufacture winches, hulls, fittings and sails. As a result of this I have ordered the locally made components where possible. The hull is being supplied in fibreglass by Paul Cohen in Canberra; a newly released, lightweight, electronic winch made by Rob and Michelle Guyatt in Adelaide; sails from Jim Bradshaw in Perth; a 14.5 mm mast from Ron Attard (an imported Bantock unit); and a two channel Attack radio control unit from the Hobby Hangar in Melbourne. At the moment all these componenets are in the process of being delivered, and once they have arrived they will form the basis of Project A. I will give an update on the project in the next issue and explain how the boat has been put together.

MONARO CUP; 13th & 14th May

Rob Guyatt and Paul Littledyke represented Riverland Model Yacht Club of SA, sailing their Vapour Trail **Mr Splash** to a 4:0 win over the defender, **Flash Nick from Jindivyk,** the Wizzle Wozzle of Canberra's Paul Cohen. Allen Drinkell represented Albert Park Model Yacht Club, Dave Birrell represented Patterson Lakes (both from Victoria), and Wayne Swinnerton skippered the entry from Bicentennial Park Club, from Sydney.

The match racing round-robin allowed for 18 races, each yacht meeting each other yacht 3 times. The racing was very close, although the results for match racing show only wins and losses.

Results for the Challengers were:

Riverland	8 wins	1 loss
Bicentennial Park	7 wins	2 losses
Patterson Lakes	3 wins	6 losses
Albert Park	0 wins	9 losses



Standing proud, the modified Wizzle Wozzle of Paul Cohen. Photo: B. Kennewell.

VICTORIAN SPEED CHAMPIONSHIPS at VFL Park Lake

(Melways page 80; H4)

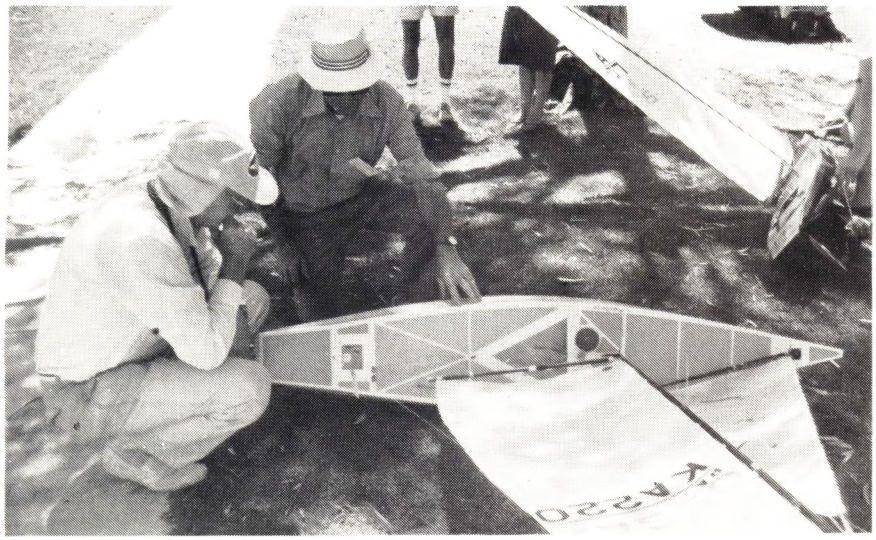
October 7th & 8th 1989

Multi:	3.5 cc	6.5 cc	15 cc
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For further information contact Peter Bons
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The Phoenix R10R of Frank Russell that had to contend with light breeze, heavy rain and hail squalls, as well as the other skippers, at the NSW Titles. Red with white trim.



Ken Williams (Townsville) and Ray Tillbrook inspect the deck construction on Rob Guyatt's Vapour Trail (A Class).

The OOD was Dave Burns, visiting from Washington DC, who presented the Cup. Rob Guyatt also took the Challenger's Shield. Each challenging club was presented with a trophy to acknowledge their efforts.

Under the terms of the Deed of Gift, the Riverland Club have to defend the trophy in not less than 12 months and not more than 15 months. After the success of this inaugural event we suggest that interested parties start working on their challenges now! The Nationals in Canberra (January 1990) could be the only major A Class event before the next Monaro Cup event!



Pat Cox's RA leads that of Rod Clark, nearest buoy, and Rob Guyatt during the Victorian Titles. Davidson photo.

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Swan Hill RC Hobby Supplies, Boga St., Lake Boga, 3584; **(050) 37 2369**
Tates Discount Toy Warehouse, 135 Shannon Ave., Geelong West, 3218; **(052) 22 4201**
Victorian Hobby Centre, 1st Floor, 21A Swanston St., Melbourne, 3000; **(03) 650 4817**
Williamstown Hobbies, 177 Ferguson St., Williamstown, 3016; **(03) 399 9262**
Wimmera Hobby Supplies, 12 Firebrace St., Horsham, 3400; **(053) 82 2319**
Wingspan Hobbies, 9C Clarke St., Lilydale, 3140; **(03) 735 3466**

QLD.

ABC Models P/L, Shop 11, 671 Gympie Rd., Chermside, 4032; **(07) 350 349**
ABC Models P/L, Shop 5 Logan Court, Cnr. Logan Road and Doughty Ave., Holland Park, 4121; **(07) 394 389**
ABC Models P/L, 48 Bundall Road, Sorrento, 4217; **(075) 38 9433**
Bundaberg Hobby World, 102 Barolin St., Bundaberg, 4670; **(071) 72 7286**
Downs Hobby Supplies, c/o The Hooper Centre, Hume St., Toowoomba, 4350; **(076) 38 532**
Gabba Hobbies, 622 Stanley St., Wooloongabba, 4102; **(07) 844 7735**
Leisuretronics Games & Hobbies, Post Office Square, Brisbane City, 4000; **(07) 231 445**
Leisuretronics Games & Hobbies, Queens Arcade, Queen St., Brisbane, 4000; **(07) 229 639**
Leisuretronics Games & Hobbies, K-Mart Plaza, Wynnum, 4178; **(07) 393 380**
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(071) 22 1633Leisuretronics Games & Hobbies, East Street, Rockhampton, 4700; **(079) 27 335**
Leisuretronics Games & Hobbies, K-Mart Plaza, Rockhampton, 4700; **(079) 27 768**
Model Sports & Hobbies, 33 Station St., Nundah, 4012; **(07) 266 2260**
Models & Hobbies North, 10 Burndah St., Kirwan, Townsville, 4814; **(077) 73 440**
Mr. Toys Toyworld, 3379 Pacific Highway, Springwood, 4127; **(07) 208 9750**
Mr. Toys Toyworld, 721 Gympie Rd., Lawnton, 4510; **(07) 205 4153**
RC Helicopters Aust., 9 Smailes Rd., Jimboomba, 4280; **(075) 46 0139**
Southside Hobby Centre, 216 Logan Rd., Buranda, 4102; **(07) 393 0537**

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ABC Models P/L, 117 Unley Rd., Adelaide, 5000; **(08) 373 1191**
ABC Models P/L, Shop 3, 1700 Main North Rd., Salisbury Plain, 5109; **(08) 258 4485**
Hobby Habit, 462 Main North Road, Blair Athol, 5084; **(08) 349 6242**
Model Flight, 42 Maple Ave., Keswick, 5035; **(08) 293 3674**
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Northern Discount Hobbies, Corner North East and Tartan Rd., Holden Hill, 5088; **(08) 261 8929**
South Australian Hobby Centre, 1st Floor, 79A Rundle Mall, Adelaide, 5000; **(08) 232 0080**
The Hobby Habit, 7/269 Main North Rd., Sefton Park, 5083; **(08) 344 8575**

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North Australian Model and Hobby Supplies, 61 Dalwood Crescent, Sanderson, NT, 0812; **(089) 27 7254**

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Perth Hobby Centre, 385 Murphy St., Perth, 6000; **(09) 322 3376**
Radio Model Supplies, 235 Albany Hwy., Victoria Park, 6100; **(09) 362 2133**
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Bryzen Hobbies, 47 Macquarie St., Fennell Bay, NSW, 2283; **(049) 59 1145**
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JR Remote Control Aust. Pty. Ltd., 424 Station St., Box Hill, Vic., 3128; **(03) 890 0660**
Model Engines (Aust), 57 Crown St., Richmond, Vic., 3121; **(03) 429 2925**
Model Sports & Hobbies, 33 Station St., Nundah, Qld., 4012; **(07) 266 2260**
O'Reilly, Leo, 42 Maple Ave., Keswick, SA, 5035; **(08) 297 7349**
Radio Control Supplies, 3/16 Dean Place, Penrith, NSW, 2750; **(047) 31 4145**
Tates Discount Toy Warehouse, 135 Shannon Ave., Geelong West, Vic., 3128; **(052) 22 4201**
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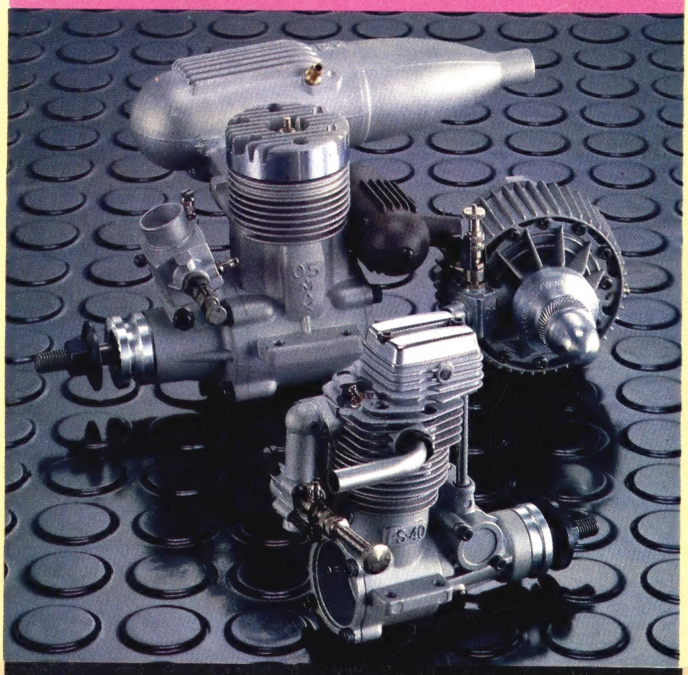
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